The Condensed Chemical Dictionary

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The Condensed
CHEMICAL DICTIONARY

A reference volume for all requiring quick access to a large
amount of essential data regarding chemicals, and
other substances used in manufacturing
and laboratory work

Compiled and Edited by
The Editorial Staff
of the

Chemical Engineering Catalog

FRANCIS M. TURNER, Editor

SECOND EDITION
Completely revised and enlarged
Under supervision of
THOMAS C. GREGORY, Editor
ISABELLE M. WELCH, Assistant Editor

BOOK DEPARTMENT
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PREFACE TO THE FIRST EDITION

The increased importance of the chemical industries has brought into contact with these industries a large number of people not educated along chemical lines. Exporters and importers, brokers and jobbers, financial houses, lawyers, librarians, purchasing agents, insurance companies and many other classes of firms and individuals have frequent need for detailed information regarding chemicals and chemical products.

The large and constantly increasing volume of such inquiries received by the Information Bureau of The Chemical Catalog Company, Inc., as well as by the public and technical libraries, has made obvious the demand existing for some one book that would supply the outstanding facts regarding the various chemicals and chemical materials ordinarily met with in commerce.

Professional chemists and chemical engineers may find it hard to appreciate that there are large numbers of people in various branches of trade who have to use or buy or sell chemical products (or who have professional or financial relations with firms doing so), who have not the least idea how to secure information on the most elemental points.

The fact that the Information Bureau of The Chemical Catalog Company, Inc., is called on almost daily to answer such questions as "Is acetone a solid or a liquid?", "Is sulfuric acid explosive?", "What is alum used for?", "What is the boiling point of toluol?", "Where does perilla oil come from?", etc., shows that the sources of such information are none too available to non-professionals.

Moreover, after asking a number of such questions, the inquirers would frequently ask, "Is there no book where we can look up things like this for ourselves? We often need information like this in our business."

A thorough search of chemical literature revealed no publication that would meet exactly the requirements of these people. Undoubtedly a collection of literature could be made that would give all the facts commonly needed, but few business men would be likely to go to the expense of accumulating such a library. The excellent facilities of the public technical libraries avail little, as business men have not the time to visit them, and moreover, good technical libraries are not convenient to all trade and manufacturing centers. Finally, the books in which the information could be obtained would contain so much more commercially irrelevant material that men unaccustomed to the use of large scientific reference works would soon be in difficulties.

One of the most frequent classes of inquiries concerned the uses of things. Importers and brokers would frequently find chemicals, oils, ores, etc., on their hands, the market for which was unfamiliar. In order to find whom to approach, it was necessary first to know the uses of the substances. In the Condensed Chemical Dictionary an attempt has been made to collect a mass of information on this subject scattered through hundreds of textbooks, periodicals, government bulletins, etc., as well as to set down a great deal that is not known to be anywhere in print.

The only solution of the above problem seemed to be the compilation of a new reference book that would meet the requirements we have attempted to outline in the previous paragraphs. Consequently, early in 1918 the work of compilation was begun by the Editorial Staff of The Chemical Catalog Company, Inc.

No attempt has been made to produce an exhaustive work. In addition to properties and uses it was thought advisable to insert brief notes as to how things are manufactured, when they are not natural products. These notes have been restricted to giving a very general idea of the process and are not intended to instruct anyone in the manufacture of the substances in question.

The properties described have been restricted to those likely to be of commercial importance, and many substances scientifically interesting have, in the interest of brevity, been omitted entirely when of no commercial importance.

While the great value of this Dictionary to the non-technical user is very apparent, it must not be lost sight of that to the chemist, even one having access to a good library, the book is invaluable as a time-saver.

Frequently a moment's reference to the Dictionary will answer a question, whereas much more time would be consumed in getting the same information from other sources. It is believed by the editors and publishers that the Dictionary will soon make a place for itself close to the hand of any chemist.

Every precaution has been taken to make the book accurate and complete within the limits set for it. In all probability some errors and omissions will be noted and the editors will be very grateful for having their attention drawn to such matters so that corrections can be made in future editions.

On a subsequent page, acknowledgment is made of the generous assistance numerous chemists, chemical engineers and others have given in connection with the compilation of the book.

THE EDITORS.

New York, September 1st, 1919.

PREFACE TO THE SECOND EDITION

As stated in the Preface to the first edition, the data in that edition were compiled primarily for the benefit of people not educated along chemical lines, whose business with the chemical industry necessitated their requiring information of various kinds regarding chemicals and chemical products. The Chemical Catalog Company, Inc., the publishers, were gratified by the demand for the book from chemists, chemical engineers, metallurgists, and other technologists. Over 16,000 copies of the first edition were sold.

It was originally planned to restrict the second edition to corrections of any data contained in the first edition either actually erroneous or obsolete through development of more accurate data since its publication; and to adding such new chemicals as have been developed in the last few years. However, conversations with members of the chemical and allied industries indicated need for a book somewhat more encyclopedic in form which would give fundamental information on a variety of raw materials and other products used in these industries. Industrial chemistry is composed of so many branches which are industries within themselves that technologists have been forced to specialize. On the other hand, research is constantly developing new by-products which find use in fields quite foreign to those in which the original product is sold. Thus, many investigators are forced to seek information on fields foreign to their lines of specialization. Certain items, therefore, have been expanded in a semi-encyclopedic fashion so that they offer a working knowledge of the fundamentals of the subject. These facts will either be sufficient for the purpose required or will prepare the investigator for consultation of advanced reference works on the subject. Students, exporters and importers, plant superintendents, chemists, chemical engineers, salesmen of chemicals and a host of other people connected with the chemical and allied industries who may not be specialists in the subject consulted, undoubtedly will find these items of interest.

A successful feature of the first edition was the definition of the fire hazard on items contained in the book and an attempt to indicate the correct label to be applied to them in their shipment by land transportation. It is obvious that an attempt to undertake a work of that character was exceptionally difficult and naturally some inaccuracies crept in. In order to remedy this difficulty as much as possible in the present edition, Mr. Charles P. Beistle, Chief Chemist of the Bureau of Explosives, perhaps the greatest expert in this country in this line, was induced to undertake this section of the work. It is believed that users of the book will welcome the appearance of this important information. A detailed description of the method of presenting these data will be found on pages 13 to 17.

Other new features include an expansion of the uses to which products may be put and an attempt to define common container sizes. The definition of container sizes is not guaranteed to be complete or absolutely accurate but is offered as a guide to present commercial practice.

It will be noted that the constants have been considerably expanded. It was not possible to complete this information for all the essential oils by the time of going to press, but the data for the largest part will be found in the Dictionary. The constants given must not be taken as the absolute limits, due to the great variation in these oils, but it is believed that they represent average values.

In order to guard against inaccuracy and to secure the latest information on the subject many of the encyclopedic items were submitted for criticism and review to gentlemen recognized as experts in their field.

Leading chemical manufacturing firms were invited to submit data on products of their manufacture, particularly on those of late development. It is gratifying to state that not only did all respond but they showed a splendid spirit of coöperation by placing at the disposal of the editors many data formerly regarded as confidential. Acknowledgment of this generous assistance will be found on the following pages.

New York, June 1, 1930. THE EDITORS.

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Zeitschrift für anorganische und allgemeine Chemie.

EXPLANATION OF THE ARRANGEMENT, TERMS AND SYMBOLS USED IN THIS VOLUME

The Dictionary is arranged in a straight alphabetical classification. Thus, ''Methyl Alcohol'' is under ''M'', not ''Alcohol, Methyl.''

Organic Nomenclature: Organic derivatives in the names of which the prefixed ''meta-'', ''ortho-'', ''para-'', ''alpha-'' and ''beta-'' occur are listed under the main name. For instance, look for ''Naphthol, Beta-'' under ''N'', not ''Beta-naphthol'' under ''B''. The numerical system has been adopted, as far as possible, for indicating the position of the groups in the intermediates, e.g., 1-Amino-8-naphthol-3:6-disulfonic acid. The common name of this product, ''H Acid'', will be found as a cross-reference to the chemical name.

Spelling: Spelling follows the rules of the American Chemical Society, as used in Chemical Abstracts. Where some other spelling is commercially in use and differs materially from the American Chemical Society standard, a cross-indexing will be found.

Temperatures: Temperatures are given mainly in degrees Centigrade. A conversion table will be found on pages 494 to 502 for those who desire Fahrenheit temperatures.

Densities: Tables giving the relations for Baumé degrees and specific gravities (densities) for liquids both heavier and lighter than water will be found on pages 503 and 504.

Formula (Molecular) Weights: Formula (molecular) weights are not given, but a table of combining (atomic) weights is given on page 491 and the formula weights may be calculated from that table and the formulas given.

Proprietary Names: Important trade and proprietary names have been included, as it is frequently not recognized in trade that those names are of a proprietary nature. Where a proprietary name is given it is generally stated that it is such. In the cases of medicinals the product is given under the proprietary name excepting in those cases where the medicinal is sold under several proprietary names. In such cases the product is described under the chemical name and the proprietary names are given in a bracketed heading and are also cross-indexed. It was not always possible to strictly follow this rule.

''Trade name'', ''proprietary name'', ''brand name'' are terms loosely applied to a number of products, e.g., various refractories. Obviously to attempt to definitely check up whether such a name was actually a registered trade name or merely a brand name would have consumed so much time as to seriously delay publication of the book. It is believed that the loose application of these terms will do no actual harm to any commercial interests but will be helpful to the user of the book in identifying the product.

Dyes: No attempt has been made to complete the information given regarding synthetic dyes, as excellent reference works exist on that subject. It has, however, been deemed advisable to include those dyes, the names of which do not indicate that they are dyes.

Medicinals, Unofficial: The designation ''unofficial'' in the ''uses'' section of a drug or medicinal item indicates that the remedy has not been recognized in either the United States or British Pharmacopoeias. On the other hand, the lack of the designation ''unofficial'' following a medicinal does not necessarily infer that it has been recognized in either of the above pharmacopoeias.

Containers: In addition to the containers mentioned for the various chemicals, glass bottles may always be inferred when small amounts are under consideration.

Grades: The term U.S.P. used under Grades refers to the United States Pharmacopoeia and signifies that the substance is sold under the mark ''U.S.P.'' and complies with the requirements of this standard as to quality, purity, etc. The grade ''C.P.'' is usually the purest obtainable. It means that the materials have been analyzed and that the containers bear a label showing the amounts of impurities which may be expected to be present. The grade ''Technical'' is the ordinary commercial product. N.F. indicates that the substance complies with the requirements of the National Formulary, issued by the American Pharmaceutical Association. N.N.R. refers to New and Nonofficial Remedies, 1927, published by the American Medical Association.

Transportation of Explosives and Other Dangerous Articles

Interstate Commerce Commission: Regulations for the transportation of explosives and other dangerous articles are prescribed by the Interstate Commerce Commission under the authority of the federal law, Act of Congress, approved March 4, 1921.

Section 233 of this Act states: ''The Interstate Commerce Commission shall formulate regulations for the safe transportation within the limits of the jurisdiction of the United States of explosives and other dangerous articles, including inflammable liquids, inflammable solids, oxidizing materials, corrosive liquids, compressed gases, and poisonous substances, which shall be binding upon all common carriers engaged in interstate or foreign commerce which transport explosives or other dangerous articles by land or water, and upon all shippers making shipments of explosives or other dangerous articles via any common carrier engaged in interstate or foreign commerce by land or water. Said commission, of its own motion, or upon application made by an interested party, may make changes or modifications in such regulations, made desirable by new information or altered conditions. Such regulations shall be in accord with the best-known practicable means for securing safety in transit, covering the packing, marking, loading, handling while in transit, and the precautions necessary to determine whether the material when offered is in proper condition to transport. Such regulations, as well as all changes or modifications thereof, shall, unless a shorter time is authorized by the commission, take effect ninety days after their formulation and publication by said commission and shall be in effect until reversed, set aside, or modified. In the execution of the provisions of this act the Interstate Commerce Commission may utilize the services of the bureau for the safe transportation of explosives and other dangerous articles, and may avail itself of the advice and assistance of any department, commission, or board of the Government, but no official or employee of the United States shall receive any additional compensation for such service except as now permitted by law.''

Section 236 of this Act states: ''When the death or bodily injury of any person results from the violation of any of the four sections last preceding, or any regulation made by the Interstate Commerce Commission in pursuance thereof, the person or persons who shall have so knowingly violated, or caused to be violated, such provision or regulation, shall be fined not more than $10,000, or imprisoned not more than ten years, or both.''

Bureau of Explosives: The Bureau of Explosives was organized by the American Railway Association in 1906 to secure safety in the transportation of explosives. Its membership consists of practically all of the railroads in the United States and Canada, express companies, steamship companies, and manufacturers of explosives and other dangerous articles and shipping containers therefor. The Bureau of Explosives endeavors, through its corps of inspectors, its chemical laboratory and its headquarters, to educate shippers' and carriers' employees in the requirements of the regulations, and to secure their enforcement.

Attention is drawn to Section 233 in which the following statement appears:

> "* * * * In the execution of the provisions of this Act the Interstate Commerce Commission may utilize the services of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles * * *."

Methods of Procedure: Regulations are ordinarily prepared by the Bureau of Explosives after consultation with shippers and others interested and are then submitted to the Interstate Commerce Commission by the Bureau of Explosives for approval and publication. These regulations and the Act of March 4, 1921, place upon the shipper of a dangerous article the duty of properly preparing a shipment for transportation, knowing its characteristics, and instructing his employees in the requirements of the regulations and securing compliance therewith. If a shipper has no knowledge of the dangerous characteristics of the material which he desires to ship, he should confer with the Bureau of Explosives and, if necessary, submit a sample for examination and report.

The work of the Interstate Commerce Commission in connection with the Act of March 4, 1921, is under the direction of the Bureau of Service. Hearings are held at suitable intervals when necessary to dispose of disputed questions.

Regulations: The Commission's regulations are published under the title: "Regulations for the Transportation of Explosives and other Dangerous Articles by Freight and Express and as Baggage Including Specifications for Shipping Containers". Copies of these regulations may be obtained under various plans on application to The Bureau of Explosives, 30 Vesey Street, New York, N. Y.

These regulations are amended periodically as new data are obtained and such amendments are described in supplements issued from time to time by the Bureau of Explosives.

Regulations issued to date cover land transportation but regulations for transportation by water and other services are in active preparation and will be issued in about two years' time (1932). A revision of the regulations for land transportation has been in course of preparation for some time and will be published about September, 1930. The following paragraphs have been taken from the manuscript:

> 1—Transportation of dangerous articles other than explosives by freight and express.
>
> For transportation purposes dangerous articles other than explosives are classed as follows:
>
> 1. Forbidden articles
> 2. Acceptable articles
>
> Group 1—Forbidden articles
>
> (a) Packages containing dangerous articles in a leaking condition, or in such an insecure condition as to make leakage probable during transit.
>
> (b) Dangerous articles not properly packed, marked, labeled, described, and certified.
>
> (c) Outside packages containing in the same compartment interior packages, the mixture of whose contents would be liable to cause a dangerous evolution of heat or gas, or produce corrosive materials.

(d) Cylinders or tank cars containing gases capable of combining chemically.
(e) Rags or cotton waste, oily with more than 5 per cent of vegetable or animal oil; wet rags, wet waste wool, wet textile waste, wet waste paper; burnt, wet or damp fiber; wet paper stock; wet jute; or wet hemp. Net hair must not be shipped except in steel gondola cars.
(f) Charcoal screenings from wet charcoal, or wet screenings, or screenings that have been wet.
(g) Iron sponge that has not been properly oxidized during manufacture; and spent oxide or spent iron mass, except when loaded in open steel cars.
(h) Acid carboys, empty, unless thoroughly washed with water and drained.
(i) Rough, ammoniate tankages (tankages made from ammoniates such as leather scrap, horns, hoofs, hair, hair waste, felt waste), containing less than 7 per cent moisture or having a temperature exceeding 100° F. when loaded.
(j) Garbage tankage, tankage fertilizers, containing less than 8 per cent moisture or having a temperature exceeding 100° F. when loaded.
(k) Fish scrap containing less than 8 per cent or more than 12 per cent moisture, or having a temperature exceeding 100° F. when loaded (does not include wet acidulated fish scrap with moisture 40 to 55 per cent).
(l) Matches of any kind which ignite spontaneously when subjected to a temperature of 200° F. in a properly conducted laboratory test. *Strike anywhere* matches when packed with any other article.
(m) Ground bituminous coal, sea coal, or coal facings 90 per cent of which will pass through a 100-mesh sieve, unless stored for at least 6 days after grinding.
Ground bituminous coal which has been dried by heating before grinding, unless packed in air tight metal containers.

In addition to the foregoing, the following articles are forbidden for express transportation:

(a) Carbon bisulfide, except when in medicinal preparations.
(b) Celluloid scrap, except samples for laboratory examination.
(c) Charcoal screenings.
(d) Fiberloid scrap, except samples for laboratory examination.
(e) Motion-picture film scrap (pieces of exposed or unexposed inflammable motion-picture film), except samples for laboratory examination.

Group 2—Acceptable articles.

Inflammable liquids—red label. An inflammable liquid is any liquid which gives off inflammable vapors (as determined by flash point from Tagliabue's open-cup tester as used for burning oils) at or below a temperature of 80° F.

Inflammable solids—yellow label. An inflammable solid is a solid substance other than one classified as an explosive which is liable, under conditions incident to transportation, to cause first through friction, through absorption of moisture, or through spontaneous chemical changes.

Oxidizing materials—yellow label. An oxidizing material is a substance such as a chlorate, permanganate, peroxide and a nitrate that yields oxygen readily to stimulate the combustion of organic matter.

Corrosive liquids—white label. A corrosive liquid is a strong mineral acid, or other corrosive fluid which is liable to cause fire when mixed with chemicals or organic matter, or is liable in case of leakage to damage other freight materially.

Compressed gases—red (gas) label or green (gas) label. A compressed gas is defined as any material with a gage pressure exceeding 25 pounds per square inch at 70° F., or any liquid inflammable material having a vapor pressure exceeding 40 pounds per square inch, absolute, at 100° F. March to October inclusive, or exceeding 45 pounds per square inch, absolute, at 100° F. November to February inclusive, as determined by the method described in appendix No. 1, I.C.C. Regulations.

Poisons: Poisonous articles are divided into three classes according to the degree of hazard in transportation.

Class A—Extremely dangerous poisons—poison gas label. (*See Note.*)

(a) Poisonous gases or liquids of such nature that a very small amount of the gas or vapor of the liquid mixed with air is dangerous to life.

Class B—Less dangerous poison—poison label.

(b) Poisonous liquid or solids of such nature that they are chiefly dangerous by actual contact with the body, or by their being taken internally as in contaminated food or feeds. The vapors of some of this class of materials are also offensive or dangerous, but to a much less extent than Class A poison.

Any poisonous material not included in paragraph (a) which has a toxicity greater than 22 milligrams per kilo body would fall within this group.

Class C—Irritating substances (tear gases)—tear gas label.

(c) Liquid or solid substances which upon contact with fire give off dangerous or intensely irritating fumes, such as bromobenzyl-cyanide, chloracetophenone, diphenylamine-chlorarsine, and diphenyl-chlorarsine, but not including any poison article, Class A.

NOTE.—Poisonous articles, Class A, are prohibited for express transportation.

Interpretation of the Regulations and Their Use in the Condensed Chemical Dictionary. Although these regulations have been drawn with great care, nevertheless, in their interpretation, differences of opinion may arise even among experts. Many factors must be considered in determining whether a substance is hazardous. A small amount of an oil in a bottle in a laboratory may not present any fire hazard, whereas a 50,000-gallon tank of the same oil may. It is likewise difficult to find any two unbiased individuals who will agree in their interpretation of the word "Dangerous". Consequently a reference work which gives reliable, explicit interpretations of the rulings on a large number of chemicals and raw materials, such as are contained in the Condensed Chemical Dictionary, will be very valuable to all those who store, package and ship these materials such as those engaged in the chemical and process industries, the railroads, shipping companies, warehouses, express companies and other forwarding agencies. As such an interpretation would be more harmful than useful unless made by an expert, the publishers of this book induced Mr. Charles P. Beistle to undertake this section of the work. As chief chemist of the Bureau of Explosives since 1907, Mr. Beistle has been constantly engaged in testing commodities to determine their hazardous nature. His rulings on many of the items in the Dictionary are based upon these actual tests. Where these data were lacking, his wide experience enabled him to interpret the regulations by an analysis of the characteristics of the commodity and of the "constants" given in this and other reference works.

The following method of showing Mr. Beistle's interpretation has been adopted:

Wherever he believed the product to be a hazard:

Fire hazard paragraph included, carrying under it the word "dangerous".

Wherever he believed the product to be non-hazardous:

No fire hazard paragraph carried.

Railroad shipping regulations:

(a) Where he had no doubt that the product required a label, the appropriate label, e.g., Red label.

(b) Where he believed the product required a label but it might be open to question, the appropriate label with a question mark, e.g., Red label (?).

(c) Where he had no doubt that the product did *not* require a label, none, e.g., None.

(d) Where he believed the product did not require a label but it might be open to question, the word none with a question mark, e.g., None (?).

The publishers of this book believe that Mr. Beistle's interpretation, as shown, is the most comprehensive and accurate attempt made to guide shippers and other handlers of materials in bulk to ship their product in accordance with the law.

Nevertheless, these interpretations are not offered, nor must they be construed as official publications either of the Interstate Commerce Commission or of the Bureau of Explosives. Accordingly, the obligation to definitely determine the hazardous character of a commodity rests with the shipper. Manufacturers who may wish to reassure themselves of the hazardous nature of their product may do so definitely by submitting a sample to the Bureau of Explosives for test.

Mr. Beistle states that the term dangerous as used by him implies that the material, if a liquid, has a low flash point; if a solid, is liable to spontaneous heating or ignition or is otherwise dangerous.

The term dangerous is applied to:

1. Inflammable gases.
2. Liquids having flash test of 80° F. or below.
3. Inflammable solids which are liable to produce fire spontaneously by exposure to air, moisture or moderate warmth.
4. Oxidizing materials which in contact with combustible materials may start fires and will certainly intensify fires.
5. Certain corrosive liquids which in addition to their corrosive effects have strong oxidizing action.

Further Information: For sources of supply of the majority of chemicals and chemical materials listed in the Dictionary consult the current edition of the ''Chemical Engineering Catalog,'' where the most prominent firms supplying each product will be found listed.

For makers of equipment for manufacturing or refining any of the substances dealt with in the Dictionary consult the current edition of the ''Chemical Engineering Catalog,'' where descriptions, accompanied by tables of sizes, capacities, etc., of the leading makes of industrial chemical equipment will be found.

The Information Bureau of the Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, will always be pleased to advise as to the sources of supply of any of the items listed in the Dictionary, or as to equipment for manufacturing or refining them.

For Technical Books dealing with any of the items listed in the Dictionary consult the Technical Book Section of the ''Chemical Engineering Catalog,'' or communicate with the Book Department, The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, which can procure any technical book in print at the publisher's own net price.

MEMORANDA

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The Condensed Chemical Dictionary

A

A. H. Gum. Proprietary name for a gum used for weighting and finishing textiles.

ADR. See Ferronickel.

AMF. See Ferronickel.

Abaiser. See Animal black, under Blacks.

Abatia. Term applied to the leaves of Abatia rugosa. Used as a black dye.

Abelmoschus (Musk mallow; Musk seed; Musk okra; Abelmosk; Amber seed; Ambrette).
Seeds of Abelmoschus.
Habitat: Egypt, India and tropical America.
Grades: Technical.
Containers: Bags.
Uses: Manufacture of perfumes; adulterating musk; preserving woolens from moths.
Railroad shipping regulations: None.*

Abel's Reagent. An etching reagent used in the micro-analysis of carbon steels. It consists of a 10% solution of normal chromic acid.

Abies Bark. The bark of the hemlock-spruce. Used in tanning.

Abietic Acid (Abietinic acid) $C_{44}H_{64}O_5$.
Color and properties: Yellowish resinous powder.
Constants: M.p. 182°C.
Soluble in alcohol, ether, chloroform and benzene; insoluble in water.
Derivation: By digesting colophony with weak alcohol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Resinates of heavy metals as varnish dryers.
Railroad shipping regulations: None.*

Abietinic Acid. See Abietic acid.

Abrasives. See Alfrax, Aloxite, Alundum, Borolon, Buhrstone, Carbofrax, Carbolon, Carborundum, Chromitron, Corubin, Corundum, Crystolon, Diatomaceous earth, Electrolon, Emery, Garnet, Grindstone, Millstone, Novaculite, Oilstone, Pumice, Scythestone, Tripoli, Volcanic ash, Whetstone.

Abrastol. See Calcium beta-naphtholsulfonate.

Abraumsalze.
Derivation: A mixture of potassium and magnesium chlorides and sulfates and other salts, overlying the rocksalt deposits at Stassfurt, Germany. This mineral was most important source of potash salts prior to 1914.
Railroad shipping regulations: None.*

Absinthe. Green liqueur containing oils of wormwood, angelica, anise and marjoram.

Absinthe Oil. See Wormwood oil.

Absinthin (Absinthiin; Absynthin) $C_{40}H_{56}O_8.H_2O$.
Color and properties: Yellowish-brown, amorphous powder; very bitter taste.
Constants: M.p. 120° to 125° C.
Soluble in water, alcohol, chloroform and ether.
Derivation: Extraction from absinthium.
Containers: Glass bottles.
Uses: Medicine (intestinal vermifuge); flavoring material.
Railroad shipping regulations: None.*

Absinthium (Wormwood).
Leaves and tops of wormwood plant, Artemisia absinthium.
Habitat: Europe, northern and western Asia, and Africa; cultivated in United States.
Grades: Technical.
Containers: Bags; boxes.
Uses: Manufacture of absinthin and absinthe.
Railroad shipping regulations: None.*

Absorption Oils. See Heavy oils.

Absynthin. See Absinthin.

Aburana. An oil derived from Brassica campretris. Used in Japan for domestic lighting and cooking.

Abyssinian Gold (Talmi Gold). A copper-zinc alloy sometimes used in the manufacture of cheap jewelry. It usually analyzes 91% copper, 8% zinc, or 86% copper, 12% zinc, 1% tin.

Acacia Bark. Bark of acacia tree, used as an astringent because of its tannin content.

Acacia Gum. See Arabic gum.

Acajou Nut. See Semecarpus.

Acanthite Ag_2S.
Similar to argentite (q.v.). Sectile, iron-black mineral.
Constants: Sp.gr. 7.2 to 7.3.
Occurrence: United States (Colorado), Saxony, Bohemia.

Accroides Gum (Black-boy gum; Xanthorrhea resin).
Derivation: A resin obtained from several species of the Xanthorrhea trees.
Habitat: Australia.
Soluble in alcohol.
Grades: Technical.
Containers: Bags.
Uses: Varnishes.
Railroad shipping regulations: None.*

Acenaphthene (Ethylenenaphthene; Ethylenenaphthalene) $C_{10}H_6(CH_2)_2$.
Color and properties: White needles.
Constants: Sp. gr. 1.0687; m.p. 95° C.; b.p. 277° C.
Soluble in hot alcohol.
Derivation: From coal-tar.
Grades: Technical.
Containers: Wooden casks.
Uses: Dye intermediates.
Railroad shipping regulations: None.*

Acerdol. See Calcium permanganate.

Acetal (Diethylacetal; Ethylidenediethylic ether; Diethylaldehyde) $CH_3CH(OC_2H_5)_2$.
Color and properties: Colorless, volatile liquid; agreeable odor; nutty after-taste.
Constants: Sp.gr. 0.831; b.p. 103° to 104°C.
Soluble in alcohol; sparingly soluble in water.
Derivation: By the partial oxidation of ethyl alcohol, the acetaldehyde first forming condensing with the alcohol.
Grades: Technical.
Containers: 25 gm. glass bottles; iron drums.
Uses: Medicine (hypnotic); solvent.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Acetaldehyde (Ethyl aldehyde; Acetic aldehyde; Aldehyde) CH_3CHO.

Color and properties: Colorless, light, inflammable liquid; pungent, fruity odor.

Constants: Sp.gr. 0.801; b.p. 21° C.

Miscible with water, alcohol, ether, benzene, gasoline, solvent naphtha, toluene, xylene, turpentine, acetone.

Derivation: (a) From "first runnings" of alcohol stills by fractionation in a special still; (b) by passing alcohol vapor over platinum black; (c) by synthesis from acetylene gas.

Grades: Technical.

Containers: 5, 10, 55 and 110 gal. steel drums; 10,000 gal. tank cars.

Uses: Manufacture of chemicals, dyes, intermediates; yeast albumin; phenol condensation products; synthetic rubber; disinfectants; silvering mirrors; hardening dry gelatin films for photography.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label.

Acetaldol. See Aldol.

Acetamide (Acetic acid amine) CH_3CONH_2.

Color and properties: Colorless needle crystals; mousy odor.

Constants: Sp.gr. 1.139; m.p. 82° C.; b.p. 223° C.

Soluble in water and alcohol.

Derivation: By the interaction of ethyl acetate and ammonium hydroxide.

Method of purification: Crystallization.

Grades: Technical.

Containers: 1 lb. bottles; air-tight barrels.

Uses. Organic synthesis.

Railroad shipping regulations: None.*

Acetaminosalol. See Salophen.

Acetanilide (Phenylacetamide; Antifebrin) $C_6H_5NH(COCH_3)$.

Color and properties: White, shining crystalline scales; slightly burning taste.

Constants: Sp.gr. 1.2105; m.p. 113° C.; b.p. 305° C.

Soluble in hot water, alcohol, ether, chloroform, acetone, glycerol.

Derivation: By the acetylization of aniline with glacial acetic acid.

Method of purification: Crystallization.

Grades: Technical; U.S.P.

Containers: 1 lb. cartons; 5, 25, 50 lb. boxes; 100 lb. kegs; 150, 200 lb. barrels.

Uses: Medicine (analgesic, antiseptic); preservative for hydrogen peroxide; stabilizer for cellulose ester "dopes" and lacquers; manufacture of intermediates (para-nitroaniline, para-nitroacetanilide, para-phenylenediamine); synthetic camphor; drug.

Railroad shipping regulations: None.*

Acetanisidine. See Methacetin.

Acetannin. See Acetyl tannic acid.

Acetarsone. See Acetylaminohydroxyphenylarsonic acid.

Acetate Green. A chrome-green pigment in which the yellow is made from lead acetate.

Acetate of Lime. Commercial term for the calcium acetate made from pyroligneous acid and milk of lime. There are a brown and a gray acetate of lime. For further data see calcium acetate.

Acetic Acid (Methanecarboxylic acid; Vinegar acid) CH_3COOH.

Color and properties: Clear, colorless liquid. Vinegar is a dilute, impure acetic acid.

Constants: Sp.gr. 1.049; m.p. 16.7° C.; b.p. 118.1° C.

Soluble in water, alcohol and ether.

Derivation: (a) The pyroligneous acid obtained from the destructive distillation of wood is neutralized with lime. The acetate of lime obtained is dissociated with hydrochloric acid in copper or iron stills and the acetic acid recovered by distillation. It is further purified by redistillation over potassium bichromate and filtering through freshly burned charcoal.

When pyroligneous acid is distilled without neutralization, the distillate coming over at 100° to 120°C. is known as wood vinegar. It is used for some technical purposes, but is generally purified by converting into a calcium salt and distilling with a mineral acid.

(b) By the oxidation of dilute ethyl alcohol, promoted by bacterial action. The solution is concentrated by fractional distillation until a little water remains. Finally, by freezing, the acetic acid may be crystallized out. Pure acetic acid, in consequence of its freezing, is known as "glacial acetic acid." Acetic anhydride is produced when acetic acid is decomposed so that water is driven off.

(c) By direct synthesis from acetylene gas using mercuric oxide as a catalyst.

Method of purification: Rectification.

Grades: Commercial, sp.gr. 1.040 (8° Tw.) 30% anhydrous acid; C.P.; U.S.P. Strength of solutions 90%, 80%, 60%, 36%, 30%, 28%; retilled 56%.

Containers: Various size bottles; 50, 100 lb. carboys; 400 to 450 lb. barrels.

Uses: Manufacture of various acetates, dyes, intermediates, cellulose acetate, artificial leather, lead whites, verdigris, artificial perfumes, smelling salts, pharmaceuticals, food flavoring extracts, phenol condensation products; medicine (drugs); insecticide; curing hams and herrings; polishing and cleaning celluloid; printing calico; scrouping silk; dyeing silk with acid and alizarin colors; coagulating rubber latex; solvent.

Railroad shipping regulations: White label for express shipments only.

Acetic Acid Amine. See Acetamide.

Acetic Acid, Glacial (Crystallizable acetic acid; Methanecarboxylic acid) CH_3COOH.

Color and properties: Clear, colorless, strongly acid liquid; crystallizes a few degrees below 15° C.

Constants: Sp.gr. 1.0553; b.p. 117° to 118° C.

Soluble in water, alcohol and ether.

Derivation: See acetic acid.

Method of purification: Redistillation.

Grades: Technical; C.P.; U.S.P. Strength of solutions 99½%, 90%, 80%.

Containers: Glass bottles; carboys.

Uses: Organic synthesis; manufacture of colors, drugs, etc.; also for manufacture of cellulose acetate used as airplane dope and for other purposes; medicine; solvent.

Railroad shipping regulations: White label for express shipments only.

Acetic Aldehyde. See Acetaldehyde.

Acetic Anhydride (Acetyl oxide; Acetic oxide) $(CH_3CO)_2O$.

Color and properties: Colorless, very mobile, strongly refractive liquid; very strong acetic odor.

Constants: Sp.gr. 1.082; b.p. 139.5° C.

Soluble in alcohol and ether; decomposes in water forming acetic acid.

Derivation: By distilling acetyl chloride with an alkali acetate. Also obtained as a by-product in the manufacture of rayon.

Method of purification: Rectification.

Grades: Technical (75, 85, 90-95%); C.P.

Containers: Various bottles; 107 lb. carboys; 480 lb. drums.

Uses: Manufacture of chemicals, intermediates, dyes, airplane dopes, synthetic drugs, cellulose acetate.

Fire hazard: Combustible, corrosive liquid.*

Railroad shipping regulations: White label, for express shipments only.

Acetic Ester. See Ethyl acetate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Acetic Ether. See Ethyl acetate.

Acetic Oxide. See Acetic anhydride.

Acetin $C_2H_3O_2C_3H_5(OH)_2$.
Color and properties: Colorless, thick liquid.
Constants: Sp.gr. 1.2212; b.p.: Decomposes.
Soluble in water, alcohol and ether.
Derivation: By heating glycerol and strong acetic acid, distilling off the weak acetic acid formed and again heating with strong acetic acid and distilling.
Method of purification: Rectification.
Impurities: Uncombined acetic acid.
Grades: Technical.
Containers: 500 gm. bottles; iron drums.
Uses: Gelatinizing smokeless powders; preparing non-congealing dynamites; production of dinitroacetylglycerin; tanning; solvent for basic dyes.
Railroad shipping regulations: None.*

Acetoaminosalol. See Salophen.

Acetobromal. See Diethylbromacetamine.

Aceto-caustin. Trichloracetic acid (q.v.).

Acetocinnamone. See Benzylidene acetone.

Acetoform. Trade name for a combination of hexamethylenetetramine and aluminum acetocitrate.

Acetonal $Al_2(OH)_2(C_2H_3O_2)_5Na$.
A 10% solution of aluminum sodium acetate prepared by dissolving sodium acetate in a solution of aluminum acetate.
Uses: Medicine (astringent and antiseptic, unofficial).
Railroad shipping regulations: None.*

Acetone (Dimethylketone; Dimethylketal; Ketopropane; Methylacetyl; Pyroacetic ether; Propanone) CH_3COCH_3.
Color and properties: Colorless liquid; fragrant, mint-like odor; inflammable.
Constants: Sp.gr. 0.7900; m.p. —94.3° C.; b.p. 56.48° C.
Soluble in water, alcohol, ether, chloroform, most volatile oils.
Derivation: (a) By the dry distillation of calcium acetate. (b) Acetylene, obtained by the action of water on calcium carbide, passes through several synthetic processes, in which mercuric oxide is employed as a catalytic agent, until acetic acid is formed. This is converted into acetone. (c) A special ferment is added to a grain mash, the product of the fermentation being butyl alcohol, with ethyl alcohol and acetone as by-products.
Method of purification: Rectification.
Grades: Technical; U.S.P.; C.P.
Containers: Various size tins; 350 lb. barrels; 70, 350, 650, 700 lb. drums; 8,000 gal. tank cars.
Uses: Solvent in manufacture of smokeless powders, varnishes, lacquers, airplane dopes, indigo, dyes of the diphenylamine series, intermediates, isoprene, artificial leather, adhesive mixtures (from nitrocellulose), lubricants, artificial perfumes, pharmaceuticals (chloroform, iodoform, bromoform, sulfonals), plastics, rubber cements; extraction of fats and oils, extraction of tannins from nut galls; purification of paraffin; substitute for alkali in photographic developers; impregnating raw cotton when dyeing with aniline black by oxidation; absorbent for acetylene gas.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Acetone Alcohol. See Methyl alcohol.

Acetone-bromoform. See Tribromo-tertiary-butyl alcohol.

Acetone, Chlorinated. See Chloroacetone.

Acetone Chloroform. See Chloretone.

Acetone Oils.
Oily residuum obtained as a by-product in the distillation of acetone. The oils consist of ketones, aldehydes and condensation products of acetone. They are sold in three grades: (a) Standard light. (b) Refined light. (c) Heavy.
Color and properties: (a) Lemon-yellow. (b) Almost water-like. (c) Dark orange-yellow.
Constants: (a) Boiling range 75° to 160° C.; sp.gr. 0.826 to 0.830. (b) Boiling range 75° C. to 105° C.; sp.gr. 0.812. (c) Boiling range 80° to 225° C.; sp.gr. 0.855 to 0.865.
Containers: 55, 110 gal. drums; 8,000 gal. tank cars.
Uses: Solvent; denaturant for alcohol.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Acetonitrile. See Methyl cyanide.

Acetophenetidine (Para-acetophenetidine; Phenacetin; Oxyethylacetanilide) $CH_3CONHC_6H_4OC_2H_5$.
Color and properties: White crystals or powder.
Constants: M.p. 135° C.
Soluble in alcohol, chloroform and ether; slightly soluble in water.
Derivation: By the interaction of para-phenetidine and glacial acetic acid or ethyl bromide and para-acetaminophenol.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: 1 lb. cartons; 5, 25, 50 lb. boxes; 100 lb. kegs; 150 lb. barrels.
Uses: Medicine (antipyretic, analgesic).
Railroad shipping regulations: None.*

Acetophenetidine, Para-. See Acetophenetidine.

Acetophenone (Hypnone; Phenylmethyl ketone; Benzoylmethide) $C_6H_5COCH_3$.
Color and properties: Colorless liquid; pungent taste and odor.
Constants: Sp.gr. 1.0329; m.p. 20.5° C.; b.p. 202° C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By treating benzene with acetyl chloride in presence of aluminum chloride. (b) Distilling a mixture of calcium acetate and benzoate.
Method of purification: Crystallization.
Grades: Technical.
Containers: ½, 1, 5 lb. glass bottles.
Uses: Perfumery; pharmaceuticals (hypnotic).
Railroad shipping regulations: None.*

Acetophenone-para-phenetidine. See Malarin.

Acetopyrine. See Antipyrine acetylsalicylate.

Acetoxane. See Acetyl-para-oxyphenylurethane.

Acetozone. See Acetylbenzyl peroxide.

Acetylaminohydroxyphenylarsonic Acid (Acetarsone; Stovarsol) $HOCH_3CONHC_6H_3AsO(OH)_2$.
Color and properties: White powder containing 27% arsenic; odorless; slight acid taste.
Soluble in alkali solutions; slightly soluble in water and alcohol.
Grades: Medicinal.
Uses: Medicine (amebic dysentery, unofficial).
Railroad shipping regulations: None.*

Acetylatoxyl. See Arsacetin.

Acetylbenzyl Peroxide (Acetozone; Benzozone; Benzoxate) $C_6H_5COOOCH_3CO$.
Color and properties: White crystals; decomposed by water, alkaloids, organic matter and some organic solvents; decomposes slowly and evaporates when gently heated, and instantaneously (possibly explosively) if quickly heated, ground or compressed. The commercial product is mixed with a neutral drying powder and contains 50% acetylbenzyl peroxide.
Constants: M.p. 36.6° C.
Moderately soluble in ether, chloroform, carbon tetrachloride and water; slightly soluble in mineral oils and alcohol.
Uses: Medicine (active germicide, cholera, typhoid, gonorrhea, malignant edema, infected ulcers, tinea tonsurans, unofficial); disinfectant.
Railroad shipping regulations: Yellow label(?)*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Acetyl Bromide CH_3COBr.
Color and properties: Colorless, fuming liquid; turns yellow in air; reacts violently with water; fumes irritate the eyes.
Constants: B.p. 81° C.
Soluble in ether.
Derivation: By the interaction of acetic acid and phosphorus pentabromide.
Method of purification: Rectification.
Grades: Technical.
Containers: Metal bottles; iron drums.
Uses: Organic synthesis; manufacture of dyes.
Railroad shipping regulations: White label(?)*

Acetyl Chloride CH_3COCl.
Color and properties: Colorless, highly refractive, fuming liquid.
Constants: Sp.gr. 1.1051; m.p. 50.9° C.
Soluble in ether.
Derivation: By mixing glacial acetic acid and phosphorus trichloride in the cold and heating a short time to drive off hydrochloric acid. The acetylchloride is then distilled.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; 110 lb. carboys.
Uses: Organic preparations (acetylating agent).
Railroad shipping regulations: White label.

Acetylene C_2H_2.
Color and properties: Colorless gas; ethereal odor; highly inflammable.
Constants: Sp.gr. 0.91; m.p. —81.5° C.; b.p. —83.6° C.
Typical analysis: 96.0% illuminants; 0.8% oxygen; 3.2% nitrogen; candle power 225; B.t.u. 1,350.
Soluble in alcohol, acetone and water.
Derivation: By the action of water on calcium carbide.
Grades: Technical.
Containers: Steel cylinders; also sold in cylinders, dissolved in acetone.
Uses: Manufacture of dyes, intermediates, chemicals (acetaldehyde, acetic acid, tetrachloroethane, trichloroethylene, hydrogen, ethylene, metallic acetylides), explosives, acetylene black, synthetic rubber, synthetic tannins, synthetic resins; enriching illuminating gas, water gas, etc.; general illuminating purposes; fuel; welding and cutting of metals.
Fire hazard: Inflammable gas.*
Railroad shipping regulations: Red gas label.

Acetylene Tetrabromide (Muthmann's liquid) $CHBr_2.CHBr_2$.
Color and properties: Yellowish liquid.
Constants: Sp.gr. 2.98 to 3.00; b.p. 239° to 242° C.
Soluble in alcohol, ether; insoluble in water.
Derivation: By the interaction of acetylene and bromine, and subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Separating minerals by specific gravity; solvent.
Railroad shipping regulations: None.*

Acetylene Tetrachloride (Tetrachloroethane) $CHCl_2.CHCl_2$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 1.582; m.p. —36° C.; b.p. 147.2° C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of acetylene and chlorine, and subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Solvent; cleansing and degreasing metals; paint removers, varnishes, lacquers, photographic film; resins and waxes; extraction of oils and fats; ethyl alcohol denaturant; organic synthesis.
Railroad shipping regulations: None.*

Acetyl Iodide CH_3COI.
Color and properties: Brown, transparent, fuming liquid.
Constants: Sp.gr. 1.98; b.p. 105° to 108° C.
Soluble in ether.
Derivation: By the interaction of acetic acid, iodine and phosphorus.
Method of purification: Distillation.
Grades: Technical.
Containers: Glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: White label(?)*

Acetylisoeugenol.
Color and properties: White crystals or powder; clove-like odor.
Constants: M.p. 80° C.
Used in perfumery.
Railroad shipping regulations: None.*

Acetylmethylenedisalicylic Acid (Urasol).
Color and properties: Yellowish-white powder.
Soluble in ether and alcohol.
Derivation: Combination of salicylic acid, acetic acid and formaldehyde.
Uses: In medicine as a genito-urinary antiseptic, unofficial.
Railroad shipping regulations: None.*

Acetyl Oxide. See Acetic anhydride.

Acetyl-para-aminophenyl Salicylate. See Salophen.

Acetyl-para-aminosalol. See Salophen.

Acetyl-para-oxyphenylurethane (Neurodin; Acetoxane) $C_6H_4(OCOCH_3)NHCOOC_2H_5$.
Color and properties: Colorless crystals; odorless.
Constants: Fusing point 87° C.
Sparingly soluble in cold water.
Uses: Medicine (antineuralgic, unofficial).
Railroad shipping regulations: None.*

Acetyl-para-phenylenediamine. See Aminoacetanilide, para-.

Acetyl-para-toluidine $CH_3CONHC_6H_4CH_3$.
Color and properties: Yellow needles.
Constants: M.p. 153° C.; b.p. 307° C.
Soluble in ether; slightly soluble in alcohol and water.
Method of purification: Not purified.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Acetylphenylenediamine. See Phenylenediamine, para-.

Acetylphenylhydrazin (Hydracetin) $C_6H_5(NH)_2C_2H_3O$.
Color and properties: Colorless, inodorous crystals.
Soluble in alcohol; moderately soluble in water.
Derivation: Replacement of hydrogen in hydrazin by phenyl and acetyl radicals.
Uses: In medicine as an antipyretic, unofficial.
Railroad shipping regulations: None.*

Acetyl Resorcinol. See Resorcinol acetate.

Acetylsalicylic Acid (Aspirin) $C_2H_3O_2C_6H_4CO_2H$.
Color and properties: White, crystalline powder.
Constants: M.p. 132° to 135° C.
Soluble in alcohol, ether and chloroform; slightly soluble in water.
Derivation: Action of acetic anhydride on salicylic acid.
Method of purification: Crystallization.
Impurities: Salicylic acid.
Grades: Technical; U.S.P.
Containers: ¼ lb. cartons (case of 96); 1 lb. cartons (case of 50); 5, 25, 50 lb. boxes; 100 lb. cases; 100, 200 lb. barrels.
Uses: Medicine (antirheumatic, analgesic, antipyretic).
Railroad shipping regulations: None.*

Acetyl Salol. See Phenylacetylsalicylate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Acetyltannic Acid (Tannyl acetate; Acetannin; Tannigen; Diacetyltannin).
Color and properties: Yellowish-white or grayish-white powder, darkening on exposure to light.
Soluble in ethyl acetate, aqueous solution of sodium borate or sodium phosphate; slightly soluble in water and alcohol.
Derivation: Heating tannin with acetic anhydride in presence of glacial acetic acid.
Grades: U.S.P.
Uses: Medicine (diarrhea).
Railroad shipping regulations: None.*

Acetyltannin. See Diacetyltannin.

Acetyl Tribromosalol. See Cordyl.

Achillea (Milfoil; Yarrow).
The flowering tops of the perennial herb, Achillea millefolium.
Habitat: Europe, America.
Chief constituents: Volatile oil; tannin; achillein.
Uses: Medicine (mild aromatic sudorific tonic, unofficial).

Acid Ammonium Tartrate. See Ammonium bitartrate.

Acid Black. Organic dye of the azo group.

Acid Calcium. See Calcium phosphate, monobasic.

Acid Liquor, Sulfite. See Sulfite acid liquor.

Acid Magnesium Phosphate. See Magnesium biphosphate.

Acid of Sugar. Oxalic acid (q.v.).

Acid Open Hearth Slag. See Slag.

Acid Phosphate. See Superphosphate.

Acid Potassium Oxalate. See Potassium binoxalate.

Acid Potassium Sulfate. See Potassium bisulfate.

Acids. See under specific title, e.g., Sulfuric acid, not Acid, sulfuric.

Acitrin (Phenylcinchoninic acid ethyl ester) $C_9H_5N(C_6H_5)COOC_2H_5$.
Color and properties: Pale yellow crystalline powder, odorless, tasteless.
Constants: M.p. 61° C.
Soluble in alcohol, ether; slightly soluble in water.
Uses: Medicine (diuretic, gout, rheumatism, unofficial).
Railroad shipping regulations: None.*

Acmite (Egirite) $NaFe(SiO_3)_2$.
A natural iron-sodium silicate.
Color: Dark brown or green. Often brown on outside of crystal and green on inside. Light yellowish-gray streak; vitreous to resinous luster.
Constants: Sp.gr. 3.50 to 3.55; hardness 6 to 6.5.
Occurrence: United States (Arkansas), Canada, Norway, Greenland.

Acoine. See Di-para-anisyl-para-phenetylguanidine hydrochloride.

Aconite (Monkshood; Wolfsbane; Friar's cowl; Japaconitine; Veratroylaconine).
Derivation: Dried tuberous root of the perennial herbaceous plant Aconitum napellus. Poisonous!
Habitat: Mountainous regions of Europe, Asia and North America.
Grades: Technical; U.S.P.
Containers: Burlap bags and boxes.
Uses: Medicine (cardiac and nerve sedative).
Railroad shipping regulations: None.*

Aconitine $C_{34}H_{47}NO_{11}$.
Color and properties: White crystalline alkaloid; feeble bitter taste; intensely poisonous!
Constants: M.p. 195° C.
Soluble in alcohol, ether, benzene and chloroform; very slightly soluble in water.
Derivation: By extraction and crystallization from the root of Aconitum napellus.
Grades: U.S.P.
Containers: ⅛, ¼, 1 oz. vials; 5, 10, 15 grain vials.
Uses: Similar to aconite, in form of the base or as the hydrobromide, hydrochloride, nitrate, sulfate.
Railroad shipping regulations: None.*
Salts obtained by interaction of the acid and alkaloid:—
Hydrobromide
$C_{34}H_{47}NO_{11}.HBr.2.5H_2O$
M.p. 163° C.
Soluble in water, alcohol and ether.
Hydrochloride
$C_{23}H_{47}NO_{11}HCl._3H_2O$.
Soluble in water and alcohol.
Nitrate
$C_{34}H_{47}NO_{11}.HNO_3.5.5H_2O$.
Soluble in water and alcohol.
Sulfate
$(C_{34}H_{47}NO_{11})_2.\ H_2SO_4$.
Soluble in water and alcohol.

Aconitylphenetidine. See Apolysin.

Acopyrin. See Antipyrine acetylsalicylate.

Acorn Sugar. See Quercitol.

Acraldehyde. See Acrolein.

Acridine $C_{13}H_9N$.
Color and properties: Small colorless needles. When the dust or vapor is inhaled it causes violent sneezing; solutions of acridine and salts irritate the skin.
Constants: Sublimes at 100°C.; m.p. 111°C.; b.p. above 360°C.
Soluble in alcohol, ether or carbon bisulfide; sparingly soluble in hot water.
Derivation: (a) By extraction with dilute sulfuric acid from anthracene and adding potassium bichromate. The acridine chromate precipitated is recrystallized, treated with ammonia and recrystallized. (b) It has been obtained synthetically by a number of processes.
Uses: Manufacture of dyes.
Railroad shipping regulations: None.*

Acriflavine Base (Neutral acriflavine; 3:6-diamino-10-methyl acridinium chloride) $C_{14}H_{14}N_3Cl$.
Color and properties: Brownish, odorless, granular powder.
Soluble in 3 parts of water; incompletely soluble in alcohol; nearly insoluble in ether and chloroform; the aqueous solutions fluoresce green on dilution.
Derivation: Synthetic.
Method of purification: Crystallization.
Grades: N.N.R.
Containers: Amber glass bottles.
Uses: Antiseptic and bacteriostatic.
Railroad shipping regulations: None.*

Acriflavine Hydrochloride (3:6-diamino-10-methyl-acridinium chloride hydrochloride) $C_{14}H_{15}N_3Cl_2$.
Color and properties: Brownish-red, odorless, crystalline powder.
Soluble in 3 parts of water; somewhat soluble in alcohol; nearly insoluble in ether and chloroform. Aqueous solutions are dark-red in color and fluoresce green on dilution. An aqueous solution (1.250) is distinctly acid.
Derivation: Synthetic.
Method of purification: Crystallization.
Grades: N.N.R.
Containers: Amber glass bottles.
Uses: Antiseptic and bacteriostatic.
Railroad shipping regulations: None.*

Acriflavine, Neutral. See Acriflavine base.

Acrolein (Propenal; Acrylic aldehyde; Allyl aldehyde; Acraldehyde) CH_2CHCHO.
Color and properties: Colorless or yellowish liquid; inflammable; disagreeable choking odor; violent action on the eyes; poisonous!
Constants: Sp.gr. 0.84; b.p. 52° C.
Soluble in water, alcohol and ether.
Derivation: (a) By the oxidation of allyl alcohol. (b) By the distillation of fats. (c) By heating glycerol with potassium bisulfate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Acrolite. Synthetic resinous material made by condensation of phenol and glycerol or its homologs.

Acrylic Aldehyde. See Acrolein.

Actaea. See Cimicifuga.

Actinium. A radioactive element found in uranium pitchblend.

Actinolite. $Ca(MgFe)_3(SiO_3)_4$.
A natural calcium-magnesium-iron silicate. One of the amphibole minerals and a member of the group containing little or no aluminum.
Color: Bright green or grayish green. See also Asbestos.
Constants: Sp.gr. 3.0 to 3.2.
Occurrence: United States (Vermont, Pennsylvania, Maryland, Virginia), Canada, Tyrol, France, Corsica.

Activated Charcoal (Active carbon). A more or less pure form of carbon characterized by a high adsorptive capacity for foreign molecules. This adsorptive power is due partly to the chemical nature of the carbon atom with its attendant free valencies and partly to the capillary structure of the charcoal which presents an enormous adsorbing surface. Other factors, such as condensation of gases and vapors in the capillaries, solid solution and chemical combination, also contribute to its adsorptive power. Activated charcoals cover a wide range of adsorptive power for various foreign molecules, depending primarily upon the size of the capillaries and the size and chemical properties of the molecules to be adsorbed.

The true density of active carbon when free from tarry material and other impurities is approximately 2.1. The apparent density varies very widely, depending on the source and treatment. Active carbon from soft woods like willow may have an apparent density as low as 0.08, while that from coconut shells may be as high as 0.45.

The chemical composition of active carbon varies very widely with the source. Bone charcoal has about 10% carbon, while that from certain kinds of wood may run as high as 98% carbon.

Preparation: By destructive distillation of carbonaceous materials, such as wood, coal, peat, nut shells, bones, and other specially prepared carbonaceous materials. Carbonization should be carried out at temperatures as low as possible to secure the desired results.

Activation: The object of the activation process is to free the pores of the primary charcoal from condensed tarry matter and adsorbed materials. The principal processes for accomplishing this are: (1) Impregnation of original material, before carbonization, with hygroscopic substances, such as zinc chloride, phosphoric acid, or sulfuric acid. Carbonization may or may not then be followed by further treatments. (2) Heating the primary charcoal at high temperatures with activating gases, such as chlorine, carbon dioxide, or steam. In some processes it is heated without activating gases in a vacuum or with limited air supply. (3) Extraction of the primary charcoal with solvents, such as carbon tetrachloride or selenium oxychloride. (4) Heating at high temperatures with the addition of certain acids, bases, or salts.

Note: It is suggested that methods 3 and 4 are of interest only in an academic sense at the present time, since all the methods for the commercial preparation are confined to methods 1 and 2.

Uses: Solvent recovery; gasoline recovery from natural gas; benzene recovery from manufactured gas; air purification by removal of odors and harmful gases; decolorizing; catalysts; gas-mask-canister filling; production of high vacuum; medical remedy for colic and diarrhea; as a germicide.

Classifying the sources of chars and their application the Chemical Warfare Service states: "Bone charcoal and chars from light woods and lignites are suitable for decolorization. Chars from medium dense woods and shells are suitable for general vapor recovery. Only chars of considerable density, specially prepared for such use, are satisfactory for gas-mask and adsorption uses."

The following list shows the principal charcoals now available in commercial quantities:

Trade Name	Country of Manufacture
Absorbite	United States
Bayer charcoal	Germany
Carboraffin	United States
Columbia	Holland
Darco	United States
Dorsite	United States
Norite	Holland, England
Nuchar	United States
Suchar	Holland, England
Super-Filtchar	United States
Super-Norite	United States
Urbain	France

Activated Sludge. See Sludge.

Actol. Silver lactate.

Adalin. See Bromodiethylacetylurea.

Adamanta. A rubber substitute said to be made from a resin, sulfur, lime, and linseed oil.

Adamantine Spar. See Corundum.

Adamon (Bornyldibromodihydrocinnamate) $C_6H_4CHBrCHBrCOOC_{10}H_{17}$.
A medicinal compound used as a sedative in neurasthenia, hysteria, and an anaphrodisiac in nymphomania. Unofficial.

Adamsite. A military poison gas developed and used by the United States Navy during the late war.

Adder Oil. The oil or fat from the viper or adder. It is composed, roughly, of 3 parts lard oil and 1 part bone oil.

Aden Gum. See Arabic gum.

Adeps Lanae, U.S.P. See Lanum.

Adeps, U.S.P. See Lard.

Adipic Acid (Adipinic acid) $(CH_2)_4(COOH)_2$.
Color and properties: Yellowish crystalline powder.
Constants: M.p. 153° C.; b.p. 265° C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: Obtained from animal and plant fats by oxidation with nitric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Adipinic Acid. See Adipic acid.

Adipocere. A mixture of calcium and potassium palmitates left as a wax-like mass when animal bodies decompose in the ground.

Adipocerite. Synonym for hatchettite (q.v.).

Admiralty. A non-ferrous alloy containing 70% copper, 29% zinc and 1% tin. It offers good resistance to dilute sulfuric acid, very dilute nitric acid, acetic acid in all concentrations in the absence of air, dilute sodium hydroxide, sea water, and moist sulfurous atmospheres.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Adnic. A non-ferrous alloy containing 70% copper, 29% nickel and 1% tin.

Adonipin.
Color and properties: Canary-yellow powder, intensely bitter taste.
Soluble in water and alcohol.
Derivation: From Adonis, a glucoside.
Uses: Medicine (similar to adonis).

Adonis. The overground portion of Adonis vernalis, a small perennial herb native to Europe and Asia. Adonis aestivalis is a substitute for the genuine article. Used in medicine (similar to digitalis).

Adraganthin. See Bassorin.

Adrenalin (Epinephrin; Suprarenin; Levo-methylaminoethanolcatechol) $C_9H_{13}NO_3$.
Color and properties: Light brown or nearly white, crystalline powder.
Constants: M.p. 205° to 212° C.
Slightly soluble in water; insoluble in alcohol, ether and chloroform.
Derivation: From the suprarenal glands of sheep and cattle or synthetically from pyrocatechol.
Grades: U.S.P.
Containers: Glass bottles.
Uses: Medicine (to overcome local congestion, to check local hemorrhage, general circulatory stimulant, to relieve asthmatic paroxysms, and to cause contraction of the uterus).
Railroad shipping regulations: None.*

Adurol. A photographic developer, said to be prepared by the action of bromine on hydroquinone.

Aegerite. See Wurtzilite.

Aeonite. See Wurtzilite.

"Aerofloat." Trade name for a flotation reagent which is stated to combine both promoter and frothing properties, for both selective and bulk flotation.

"Aeroids." Trade name for a brand of sodium cyanide in ½ oz. ball form. It is stated to contain 96 to 98% NaCN(51 to 52% cyanogen).

Aether, U.S.P. See Ether.

Aethylis. See corresponding ethyl compounds.

African Kino.
Color and properties: Hard, brittle, opaque, almost black lumps similar in appearance to dragon's blood. Minute fragments, reddish and transparent. Odorless. Strongly astringent and sweetish taste.
Almost entirely soluble in water.
Derivation: Dried juice from Pterocarpus erinaceus, Lamarck and Poiret.
Uses: Similar to kino (q.v.).

African Pepper. See Capsicum.

African Saffron. See Carthamus.

Agalite (Mineral pulp; Asbestine pulp). A variety of talc (q.v.) from New Jersey.

Agalmatolite. See Pyrophyllite.

Agar. See Agar-agar.

Agar-agar (Japanese, Bengal, Ceylon, or Chinese isinglass or gelatin; Macassargum; Layor carranga; sometimes erroneously called Vegetable glue or gelatin).
Dried mucilaginous substance extracted from various species of Gelidium and Algae. Unground, in thin, translucent membranous pieces; ground, pale, buff powder.
Habitat: Pacific and Indian Oceans; Japan Sea.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Culture medium in bacteriology; sizing for silk; adhesives; substitute for gelatin; pharmaceutical preparations; photography (ingredient of sensitized emulsions); ingredient of vegetarian foods; sausage casing manufacture; food stuffs (thickening agent in milk, cream, ice cream, etc., substitute for white of egg).
Railroad shipping regulations: None.*

Agaric. Fungus growth upon European larch and various coniferous trees in western United States and Canada; commercially, principally from larch forests near Archangel. Used in medicine chiefly in treatment of sweats.

Agaricin. A preparation containing active agaric acid, obtained from agaric. Used in medicine (similar to agaric).

Agate.
A form of native silica or quartz (q.v.) essentially a variegated chalcedony. The colors are either banded, irregularly clouded, or due to visible impurities as in moss agate which has brown moss-like or dendritic forms, as of manganese oxide, distributed through the mass. The bands differ in porosity and may be colored artificially.
Uses: Gems; pestles and mortars; burnishers or polishers for gold workers and bookbinders; textile rollers; pivot supports for balances and magnetic needles; balls for ball mills.

Agate-jasper. See Jasper.

Agathin. See Salicyl-alpha-methylphenylhydrazine.

Agatized Wood. Wood petrified with clouded agate.

Age-rite Powder. A trade name applied to phenyl-beta-naphthylamine used as a rubber antioxidant and age resister. It is a white powder with sp.gr. 1.19 and m.p. 108°C. Used for hot-cured goods generally and to retard tread cracking.

Age-rite Resin. A trade name applied to aldol-alpha-naphthylamine used as a rubber antioxidant and age resister. It is a red resin with sp.gr. 1.16. Used in hot-cured goods generally. Good dispersing agent for carbon black.

Age-rite White. A trade name applied to symmetrical di-beta-naphthyl-para-phenyldiamine used as a rubber antioxidant and age resister. It is a white powder with sp.gr. 1.20 and m.p. 170°C. Used in vapor-cured goods, specification goods calling for maximum acetone extract, and thread and bands.

Agnin. See Lanum.

Agnolin. See Lanum.

Agropyrum. See Triticum.

Ague Tree. See Sassafras bark.

Agurin. See Theobromine-sodium acetate.

Air.
The approximate composition is:

	By volume %	By weight %
Nitrogen	78.64	76.22
Oxygen	20.89	23.12
Argon	0.938	1.37

Air Gas. A gas obtained by blowing air over a bed of incandescent solid fuel. An air gas is also obtained by blowing air through layers of the very volatile petroleum distillates, from 80° to 90° Bé.

Airogen. See Bismuth oxyiodogallate.

Airol. See Bismuth oxyiodogallate.

Airplane Oil.
One grade which is stated to have proved useful:
Color and properties: White, straight-reduced, viscous, neutral oil.
Constants: Gr. 32° to 34° Bé.; flash point 415° F.; fire test 480° F.; cold test 20° F.; viscosity 185 to 200 Saybolt.
Railroad shipping regulations: None.*

Ajava Oil. See Ajowan oil.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ajowan Oil (Ajava oil; Ptychotis oil).
Color and properties: Colorless or brownish-colored essential oil; strong thymol odor; sharp burning taste. Phenol content 45 to 57%.
Chief known constituents: Thymol, thymene, pinene, para-cymene and dipentene.
Constants: Sp.gr. 0.910 to 0.930; optical rotation, dextrogyrate to + 5°; refractive index, about 1.500.
Derivation: By distillation of the fruits of Carum ajowan, Benth. et Hook. Native to India, Egypt, Persia and Afghanistan.
Solubility in alcohol: Insoluble in 1 to 2.5 vols. and more of 80% alcohol.
Uses: Medicine.
Railroad shipping regulations: None.*

Akee Oil. A non-drying, yellow, butter-like fat obtained from Blighia sapida.

Alabandite (Manganblende). MnS.
Dark iron-black mineral with brown tarnish and olive green streak, metallic luster. A natural sulfide of manganese containing 63.1% Mn, and found with other metallic sulfides. Manganese minerals are derived in part from alteration of this species.
Constants: Sp.gr. 3.95 to 4.04; hardness 3.5 to 4.
Occurrence: United States (Colorado).

Alabaster. See Gypsum.

Alamandine. See Garnet.

Alant Acid Anhydride. See Helenin.

Alant Camphor. See Helenin.

Alant Starch. See Inulin.

Alantolactone. See Helenin.

Alapurine.
A name given to the purest grades of lanum (q.v.).

Albahaca Oil. See Tolu oil.

"Albalith." Trade name for a lithopone.

Albany Slip. See under Clays.

Albargin (Silver gelatose).
Color and properties: Yellow, shining powder, sometimes coarse. Contains 14.8 to 15% silver. Acts slowly on albumin, incompatible with tannin and chlorides. May be used as a double solution with cocaine if freshly made, otherwise will precipitate cocaine. Slowly reduced by light.
Soluble in water.
Containers: Amber-colored bottles.
Uses: Medicine (astringent, antiseptic, inflammations of the mucous membrane, unofficial).
Railroad shipping regulations: None.*

Albasan. A trade name for a mixture of organic bases and beta-naphthol used as a rubber antioxidant and age resister. It is either a flaked or granular cream with sp.gr. 1.17 and m.p. 75° to 100°C. Used in rubberized sheetings, clothing, light and bright-colored footwear, druggists' sundries, etc.

Albertite. A natural, jet-black, pitch-like, brittle hydrocarbon with conchoidal fracture, differing from ordinary asphalt in being only partly (about 30%) soluble in turpentine and in very imperfect fusion when heated. Sp.gr. about 1.1. On destructive distillation yields mineral oil and coke.
Railroad shipping regulations: None.*

Albite. See Feldspar.

Albolene. See Petrolatum, liquid.

Albumen. See Albumin.

Albumin, Blood.
Derivation: Ox-blood is allowed to coagulate and the serum separated by centrifuging. The decantered liquor is filtered, decolorized and subsequently evaporated.
Grades: Technical.
Containers: 100, 332 lb. drums; 300 lb. barrels.
Uses: Photographic papers; textile printing; clarifying agent; leather industry.
Railroad shipping regulations: None.*

Albumin Bromate. See Bromalbacid.

Albumin Colors.
Colors used in textile printing and so called because they are mechanically held to the fiber through the agency of coagulated albumin.

Albumin, Egg. Fresh white separated from the yolk, diluted with water, beaten to froth and subsequently filtered and evaporated.
Grades: Technical.
Containers: 150, 200, 225 lb. cases.
Uses: Leather industry; foodstuffs; clarifying agent; photography.
Railroad shipping regulations: None.*

Albumin Iodate. See Iodalbacid.

Albumin, Milk. Casein is coagulated from milk by rennet or by dilute acids, filtered and dried.
Grades: Technical.
Containers: Wooden kegs.
Uses: Adhesives; varnishes; ivory substitutes.
Railroad shipping regulations: None.*

Albumin Paper.
A photographic printing paper on which albumin is used as the ground and silver chloride as the sensitive substance.

Albumin Tannate (Tannin albuminate).
Color and properties: Yellowish-white powder, odorless. Decomposed by aqueous solutions of alkali hydroxides and carbonates.
Slowly soluble in artificial gastric juice; almost insoluble in water, alcohol, chloroform, ether.
Derivation: Interaction of dilute aqueous solutions of egg albumin and tannic acid.
Grades: U.S.P.
Uses: Medicine (astringent, chronic enteritis, diarrheas).
Railroad shipping regulations: None.*

Alclad 17 ST. Consists of a heat-treated strong aluminum alloy core protected from corrosion by a surface layer of high purity aluminum alloyed and integral with the core. The alloy contains 94% aluminum, 4% copper, 0.5% magnesium and 0.5% manganese. The coating contains 99.7+% aluminum. It is recommended when high strength and resistance to atmospheric attacks are required. See also Aluminum.

Alcohol. The term as used in common parlance applies to ethyl alcohol. Chemically, alcohol is a generic term applied to a series of compounds, the simplest of which have the general formula $C_nH_{2n+1}OH$. Alcohols may be mono-, di-, or triatomic, according to the number of hydroxyl radicals (OH) they contain, and primary, secondary or tertiary, according to the position of the hydroxyl radical in the formula. The phenol series of compounds are known as aromatic alcohols. Among the various alcohols covered in this book are: Ethyl, methyl, allyl, amyl, benzyl, bornyl, butyl, caprylic, cetylic, cinnamyl, ethylene, glycyl, heptylic, isobutyl, isopropyl, phenylethyl, propenyl, propyl, etc.

Alcohol, Absolute. See Ethyl alcohol.

Alcohol, Acetone. See Methyl alcohol.

Alcohol, Bornyl. See Borneol.

Alcohol, Butyric. See Butyl alcohol.

Alcohol, Caustic. See Caustic alcohol solution; also Sodium ethylate.

Alcohol, Dehydrated. See Ethyl alcohol (absolute).

Alcohol Denaturants. See Denatured alcohol.

Alcohol, Denatured. See Denatured alcohol.

Alcohol, Ethylene. See Ethylene glycol.

Alcohol, Ethylic. See Ethyl alcohol.

Alcohol, Glycyl. See Glycerol.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Alcohol, Grain. See Ethyl alcohol.

Alcohol, Hecdecatylic. See Cetylic alcohol.

Alcohol, Hexadecyl. See Cetylic alcohol.

Alcohol, Octoic. See Caprylic alcohol.

Alcohol, Octylic, Secondary. See Caprylic alcohol.

Alcohol, Palmityl. See Cetylic alcohol.

Alcohol, Phenylallylic. See Cinnamyl alcohol.

Alcohol, Propenyl. See Glycerol.

Alcohol, Pseudobutyl. See Butyl alcohol, tertiary.

Alcohol, Pseudopropyl. See Isopropyl alcohol.

Alcohol, Styrylic. See Cinnamyl alcohol.

Alcohol, Tertiary Trichlorobutyl. See Chloretone.

Alcohol, Wood. See Methyl alcohol.

Aldehyde. A generic term applied to a class of organic compounds holding an intermediate position between the alcohols and the acids derived from the alcohols by oxidation. The alcohol by the loss of hydrogen yields the aldehyde, and the aldehyde by addition of oxygen yields the acid:

$CH_3.CH_2.OH$	$CH_3.CHO$	$CH_3.CO.OH$
ethyl alcohol	acetaldehyde	acetic acid

Acetaldehyde is commonly called simply aldehyde. Among the various aldehydes covered in this book are: Acetic, anisic, caprylic, cinnamic, furfur-, heptoic, isobutyl, isovaleric, oenanthic, oxybutyric, propyl, salicylic, etc.

Aldehyde, Acetic. See Acetaldehyde.

Aldehyde Ammonia $CH_3CHOHNH_2$.
Color and properties: White crystalline solid; stable in closed containers, resinifies on long exposure to air.
Very soluble in water and alcohol.
Constants: M.p. 97° C.
Derivation: Action of actaldehyde on ammonia.
Methods of purification: Crystallization.
Grades: Technical.
Container: 100 lb. galvanized iron drums.
Uses: Accelerator for vulcanization of rubber.
Railroad shipping regulations: None.*

Aldehyde, Furfur-. See Furfural.

Aldehyde, Furfuranecarboxylic. See Furfural.

Aldehyde, Heptoic. See Oenanthol.

Aldehyde, Isobutyryl. See Isobutyl aldehyde.

Aldehyde, Oenanthic. See Oenanthol.

Aldehyde, Oxybutyric. See Aldol.

Aldehyde, Propionic. See Propyl aldehyde.

Aldehyde, Pyromucic. See Furfural.

Aldehyde Resin. A resin made by treating an aldehyde with caustic soda or other condensing agent.

Aldehyde, Salicylic. See Salicylous acid.

Alder Buckthorn (European). See Frangula.

Aldol (Acetaldol; Oxybutyricaldehyde; Hydroxybutyraldehyde; Hydroxybutyraldehyde, beta-) $CH_3CHOHCH_2CHO$.
Color and properties: Clear water-white to pale yellow syrupy liquid which polymerizes rather easily to paraldol in the absence of small amounts of water and acetaldehyde. Decomposes into crotonaldehyde and water on distillation under atmospheric pressure.
Constants: Sp.gr. 1.1098 (15.6° C/4° C.); flash point 181.4° F.; freezing point below 0° C.
Soluble in water, alcohol, ether.
Grades: Technical (98%).
Containers: 5, 10, 55, 110 gal. drums; tank cars.
Uses: Synthesis of rubber accelerators and age resisters; perfumery; engraving; ore flotation.
Railroad shipping regulations: None.*

Aleppo Galls. See Galls.

Aletris (Star grass; Unicorn root; Blazing star; Colic root).
Dried rhizome and root of Aletris farinosa.
Habitat: Eastern United States (Tennessee, Carolinas).
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (simple bitter).

Alformin. A 16% solution of aluminum subformate, $Al(HCOO)_2OH$, used in medicine as an astringent and disinfectant. Unofficial.

"Alfrax." A registered proprietary name for electrically fused alumina, Al_2O_3.
Physical characteristics: Pink to white; 87% Al_2O_3; brick quite smooth; weight per cu. ft. 185 lbs.; porosity 17 to 24%; pyrometric cone equivalent cone 39 plus; thermal conductivity 22 B.t.u. per sq. ft. per inch thick per degree F. per hour; refractory product.
Derivation: Prepared by fusion of bauxite in electric furnaces.
Grades: Brick, shapes of all kinds, cements.
Containers: Crates; drums; kegs.
Railroad shipping regulations: None.*

Algarobilla. The pods of Cesalpinia brevifolia. The pods contain 60% tannin.
Habitat: South America.
Grades: Based on tannin content.
Containers: Bags.
Uses: Tanning extracts.
Railroad shipping regulations: None.*

Algaroth Powder. See Antimony oxychloride.

Alite. One of the four fundamental constituents of cement.

Alival (Iododihydroxypropane) $CH_2CHOHCH_2OHI$.
Color and properties: White crystals, odorless.
Constants: M.p. 48° to 49° C.
Soluble in water, alcohol.
Uses: Medicine (antisyphilitic, unofficial).
Railroad shipping regulations: None.*

Alizarin (1:2-Dihydroxyanthraquinone) $C_6H_4(CO)_2C_6H_2(OH)_2$.
Color and properties: Yellow crystals.
Constants: M.p. 289° C.; b.p. 430° C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: Anthracene is oxidized to anthraquinone, the sulfonic acid of which is then fused with caustic soda and potassium chlorate, the melt is run into hot water and the alizarin precipitated with hydrochloric acid.
Grades: Technical.
Containers: Wooden barrels; kegs.
Uses: Manufacture of dyes; production of lakes.
Railroad shipping regulations: None.*

Alizarin Assistant. The same as Turkey red oil (q.v.).

Alizarin Oil. The same as Turkey red oil (q.v.).

Alkali Metals.
Potassium, sodium, lithium, rubidium, and cesium. The alkali metals are all soft, silvery metals, which may be readily fused and volatilized, the melting and boiling points becoming lower with increasing atomic weight. The specific gravity increases with, but less rapidly than, the atomic weight, the atomic volume therefore becoming greater as the series is ascended. They are the most strongly electro-positive of the metals, their hydroxides being the most powerful bases known; within the group itself the basicity increases with atomic weight, that of cesium being the greatest.

Alkaline Earth Metals. Barium, calcium, strontium.

Alkaline Earths.
These are usually considered to be the oxides of barium, calcium and strontium but some authorities also include the oxide of magnesium.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

The alkaline earths are intermediate in their properties between the true alkalis and the earths proper.

Alkalis

A term that should more properly be restricted to the hydroxides and carbonates of sodium and potassium but which is sometimes loosely applied to embrace the hydroxides and carbonates of the other alkali metals (q.v.), the alkaline earth metals (q.v.), and the bicarbonate and hydroxide of the radical ammonium.

In commerce the term is used to designate the main products of the alkali industry and embraces the hydroxide and carbonates of sodium (or combinations thereof) and the hydroxide and carbonate of potassium; such products being known as: Caustic soda, soda ash, bicarbonate ("bicarb") of soda, sal soda (washing soda), caustic potash, neutral sodas (modified sodas), causticized ash, etc. For additional data on these see under each item.

The general properties of an alkali may be divided into three groups:

(a) The power to neutralize an acid and form a salt.

(b) The ability of their solutions to change the color of certain indicators; e.g., turning red litmus blue, methyl orange yellow, phenolphthalein red, etc.

(c) Imparting a soapy feel and taste to their aqueous solutions.

Valuation of alkali. See under Soda ash and Sodium hydroxide.

Alkaloids.

A group of basic nitrogenous organic compounds, usually of vegetable, though sometimes of animal, origin which exhibit a powerful toxic action on the human or animal system. Though some are liquids, they are usually colorless, crystalline solids which combine with acids without elimination of water. Soluble in alcohol, less so in chloroform, ether, benzene, amyl alcohol, petroleum; insoluble, or sparingly soluble in water. For additional data see under each specific alkaloid.

Alkanet. See Alkanna.

Alkanna (Alkanet). Root of a herbaceous perennial plant Alkanna (Anchusa) tinctoria.

Habitat: Asia Minor, southeastern Europe.

Containers: Bags.

Uses: Coloring principle soluble in alcohol, ether and oils.

Railroad shipping regulations: None.*

Alkermes. See Kermes.

Allanite (Orthite; Bodenite; Cerine; Muromontite; Pyrorthite; Tautolite; Uralorthite; Wasite).

A natural complex variable silicate of aluminum, iron, the cerium metals (see Rare earths) and in smaller quantity those of the yttrium group.

Color: Brown to black; pleochroism strong: (a) greenish-brown; (b) reddish-brown; (c) brownish-yellow. Submetallic, pitchy or resinous luster. Streak, nearly white.

Constants: Sp.gr. 3.0 to 4.2; hardness 5.5 to 6.

Occurrence: United States (New York, North Carolina, Texas, Virginia, Wyoming), Greenland, Scandinavia, Russia, Germany, Austria, Madagascar.

Allegheny Metal. A ferrous alloy containing iron, 17 to 20% chromium, 7 to 10% nickel, less than 0.5% manganese, less than 0.5% silicon and less than 0.2% carbon. It offers good resistance under all conditions to nitric acid, acetic acid, sodium hydroxide, ammonium hydroxide, sea water, moist sulfurous atmospheres and mine waters.

Allium. The fresh bulb of the perennial plant Allium sativum. Used as condiment, in medicine, and as a source of garlic oil.

Allophanamide. See Biuret.

Alloys.

A mixture of two or more metals, usually effected by fusion, to form an entirely new metal. When mercury is one of the constituent metals the final product is termed an amalgam. For data on various corrosion-resisting, heat-resisting and electrical resistance alloys see under the specific alloy.

Allspice. See Pimenta.

Allspice Oil (Pimento oil; Pimenta oil).

Color and properties: Yellow to brownish-colored essential oil; agreeable, spicy, somewhat clove-like odor; pungent taste. Phenol content: 65 to 80%.

Chief known constituents: Eugenol, cineol, phellandrene, caryophyllene, eugenol methyl ether, palmitic acid.

Constants: Sp.gr., 1.024 to 1.055; optical rotation −0° 40′ to −5°; refractive index, 1.525 to 1.534.

Solubility in alcohol: In 1 to 2 vols. and more of 70% alcohol (sometimes with opalescence and even turbidity upon dilution).

Derivation: By the distillation of the fruit of Pimenta officinalis, L.

Uses: Medicine; flavoring.

Railroad shipping regulations: None.*

Allyl Alcohol CH_2CHCH_2OH.

Color and properties: Limpid liquid; pungent odor; violent effect on eyes; poisonous!

Constants: Sp.gr. 0.08491; m.p. −129° C.; b.p. 96.69° C.

Soluble in alcohol, ether; insoluble in water.

Derivation: By heating glycerol, oxalic acid and ammonium chloride. Product recovered by distillation.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles; iron drums.

Uses: Military poison gas; intermediates; pharmaceuticals (manufacture of allyl iodide, allyl bromide, allyl salicylic ester, allyl cinnamic ester, dial, etc.) and preparations.

Fire hazard. Dangerous.*

Railroad shipping regulations: None(?)*

Allyl Aldehyde. See Acrolein.

Allylisothiocyanate. See Allyl mustard oil.

Allyl Mustard Oil (Allylisothiocyanate; Isothiocyanallyl; Artificial mustard oil) C_3H_5CNS.

Color and properties: Colorless oil which gradually turns yellow; penetrating odor, very harmful to the lungs; blisters the skin.

Constants: Sp.gr. 1.020 to 1.025 at 15° C.; b.p. 151° to 153° C. (760 mm.); optically inactive; refractive index 1.527 to 1.530.

Solubility in alcohol: In 8 vols. of 70% alcohol; miscible in all proportions with 90% alcohol.

Derivation: Contained in volatile mustard oil; in the plants Alliaria officinalis, Capsella bursa pastoris, species of Cardamine and Sisymbrium, Cochlearia armoracia and Thlaspiarvense; or chemically by the distillation of allyl iodide or allyl bromide with an alcoholic solution of potassium rhodanate.

Railroad shipping regulations: None.*

Allylphenylmethylic Ether, Para-. See Anethole.

Allylpyrocatecholmethylene Ester. See Safrole.

Allyl Salicylate.

Color and properties: Colorless fragrant liquid.

Derivation: Refluxing allyl alcohol with salicylic acid in presence of mineral acid.

Uses: In perfumery as a modifier.

Almandite. See Garnet.

Almond, Bitter.

Ripe seed of Prunus amygdalus var. amara (Amygdalus communis).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Habitat: Italy, Spain and southern France.

Grades: Technical.

Containers: Barrels; burlap bags.

Uses: Preparation of amygdalin; recovery of the essential oil; flavoring compounds.

Railroad shipping regulations: None.*

Almond Meal.

Residue obtained after expressing oil from almonds.

Grades: Technical.

Containers: 200 lb. barrels.

Uses: Cosmetics; manufacturing bitter almond water; perfume base; cooking; confectionery.

Railroad shipping regulations: None.*

Almond Oil, Bitter.

An essential oil derived from either the seeds of Prunus amygdalus, Stokes (Amygdalus communis, L.), the almond tree, or the seeds of Prunus armeniaca, L., the apricot tree. Only a small amount of the commercial oil is derived from almonds. Bitter almond oil may be deprived of its hydrocyanic acid. It changes to a crystalline mass on exposure to the air, hence should be kept in tightly closed completely filled containers.

Two varieties: (a) Oil containing hydrocyanic acid; (b) Hydrocyanic acid-free oil.

Color and properties: (a) Colorless oil subsequently becoming yellow. Bitter almond odor. Smell cautiously! Neutral reaction when freshly prepared, later acquiring an acid reaction. Hydrocyanic acid content 11%. (b) Colorless oil subsequently becoming yellow. Oxidizes more rapidly than the oil containing hydrocyanic acid.

Chief known constituents: (a) Benzaldehyde, hydrocyanic acid, benzaldehyde cyanhydrin.

Constants: (a) Sp.gr. 1.045 to 1.070 at 15° C.; optical rotation $+0°$ (occasionally slightly dextrogyrate, to $+0° 9'$); refractive index 1.532 to 1.544. (b) Sp.gr. 1.050 to 1.055 at 15° C.; b.p. 179° C.; optically inactive; refractive index 1.542 to 1.546.

Solubility in alcohol: (a) In 1 to 2 vols. or more of 70% alcohol; in 2.5 vols. or more of 60% alcohol (solubility diminishes with time). (b) In 1 to 2 vols. and more of 70% alcohol.

Adulteration: Nitrobenzene, synthetic benzaldehyde.

Containers: 1, 5, 10 lb. bottles; 25 lb. tins.

Uses: Medicine; flavoring.

Railroad shipping regulations: None.*

Almond Oil Bitter, Artificial. See Benzaldehyde.

Almond Oil, Sweet.

Color and properties: Yellowish liquid; almost odorless.

Constants: Sp.gr. 0.915 to 0.920.

Soluble in ether, chloroform, benzene; slightly soluble in alcohol; insoluble in water.

Derivation: Expressed from the seed of Amygdalus communis.

Chief constituent: Olein.

Grades: Technical: U.S.P.

Containers: Iron drums; tins; glass bottles.

Uses: Perfumes; lubricant for delicate mechanisms; medicine (emollient).

Railroad shipping regulations: None.*

Almond, Sweet (Jordan almond).

Ripe seed of Prunus amygdalus var. dulcis.

Habitat: Southern Europe; southern California.

Uses: Food; medicine (nutrient, demulcent); source of sweet almond oil.

Aloe-emodin (Isoëmodin). Isomeric with emodin (q.v.).

Aloes.

Color and properties: Orange-brown to blackish-brown, opaque, resin-like masses; saffron-like odor; strongly bitter taste.

Derivation: Inspissated juice of leaves of Aloe vulgaris and other species of Aloe.

Principal varieties: Socotrine (east coast of Africa and Arabia); Barbados or Curacao (West Indies); Cape (South Africa).

Grades: Technical; U.S.P.

Containers: Bags.

Uses: Medicine (cathartic).

Railroad shipping regulations: None.*

Aloes Oil. An oil obtained from Socotrine aloes.

Aloin (Barbaloin).

Color and properties: Yellow crystals with bitter taste, derived from aloes.

Soluble in acetone and alkalis.

Grades: Technical; U.S.P.

Containers: 1, 5, 10 lb. packages; 25 lb. boxes; 100 lb. cases.

Uses: Medicine (cathartic); stimulant of fermentation.

Railroad shipping regulations: None.*

Aloinum, U.S.P. See Aloin.

"Aloxite." Registered proprietary name for aluminum oxide and products manufactured from aluminum oxide.

Color and properties: White to dark wine-colored, very tough and dense crystalline masses of artificial aluminum oxide.

Constants: Sp.gr. 3.9 to 4.0.

Derivation: Prepared by fusion of bauxite in an electric furnace.

Grades: Grains, from 8 mesh to finest powders.

Containers: Kegs.

Uses: Abrasives; refractories; grinding wheels; filters.

Railroad shipping regulations: None.*

Alpha Compounds. The position of a substituting group of atoms (radical) in the main group of a compound is denoted by lettering the carbon atoms of the main group according to the Greek letters alpha, beta, gamma, etc., starting from some particular carbon atom. Thus acids start lettering from the carboxylic (COOH) group: CH_3CH_2COOH propionic acid, $CH_3CHClCOOH$ alpha-chloropropionic acid, CH_2ClCH_2COOH beta-chloropropionic acid, Such designation is ordinarily omitted where only one position is possible or where only one compound is in commercial usage. Specific alpha compounds will be found in alphabetical order, viz: Alpha-naphthol. See Naphthol, Alpha-.

Alphol (Naphthylsalicylate, alpha-) $HOC_6H_4COOC_{10}H_7$.

Color and properties: White, crystalline powder, incompatible with alkalis and ferric compounds.

Constants: M.p. 83° C.

Soluble in alcohol, ether and fixed oils; insoluble in water.

Derivation: By the action of salicylic acid upon alpha-naphthol.

Uses: Medicine (antiseptic, antirheumatic, unofficial).

Railroad shipping regulations: None.*

Alpinia Oils. Type of oil obtained by distillation of rhizomes of species of Alpinia, chief of which is galanga oil.

"Alsifer." A trade name for carbonless alloy of aluminum, silicon, and iron used in deoxidizing steel.

Alsol.

A 50% solution of aluminum acetotartrate stated to be a more powerful germicide than phenol.

Uses: Medicine (antiseptic astringent, catarrhal affections of female genitalia, pharyngitis, pruritus, intertrigo, acne vulgaris and other skin diseases, unofficial).

Railroad shipping regulations: None.*

Alstonia. Dried bark of Alstonia scholaris, indigenous to India and the Philippines. Used as source of ditain (q.v.).

Altaite. A natural lead telluride, PbTe, found in Colorado.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Althea (Marshmallow).
Dried root, flowers and leaves of Althea officinalis.
Habitat: Europe; United States.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (demulcent).
Railroad shipping regulations: None.*

Alum. The term alum strictly refers to double sulfates of aluminum and another metal, but is commonly incorrectly used to refer to various grades of aluminum sulfate. The common alums are ammonia alums (aluminum-ammonium sulfate), potassium (potash) alum (aluminum-potassium sulfate), and sodium (soda) alum (aluminum-sodium sulfate).

Alum, Ammonia. See Aluminum-ammonium sulfate.

Alum, Burnt. Aluminum-ammonium sulfate or aluminum-potassium sulfate heated just sufficiently to drive off the water of crystallization.

Alum, Chrome. See Chromium-potassium sulfate.

Alum, Extra Concentrated. Alum containing 22% of aluminum.

Alum Meal. Crystals of potash alum containing small amounts of iron.

Alum, Neutral. A neutral basic alum prepared by adding sodium hydroxide solution to a solution of alum until the precipitate obtained is just redissolved.

Alum, Pearl. Specially prepared aluminum sulfate for the paper making industry.

Alum, Pickle. Aluminum sulfate prepared to meet specifications of packers and preservers.

Alum, Porous. See Sodium-aluminum sulfate.

Alum, Potash. See Aluminum-potassium sulfate. For the native product see Kalinite.

Alum, Roche. An impure native alum containing iron.

Alum, Roman. Aluminum salts containing insoluble iron salts made at Tolfar, Italy.

Alum Root. See Geranium.

Alum Schist. See Alum shale.

Alum Shale (Alum schist; Alum slate). A natural mixture of iron bisulfide, alumina, silica and bituminous matter.

Alum Slate. See alum shale.

Alum, Sodium. See Sodium-aluminum sulfate.

Alum Stone. See Alunite.

Alumen, U.S.P. See Aluminum-potassium sulfate.

Alumina.
An oxide of aluminum corresponding to the formula Al_2O_3. It is customary to express the content of aluminum in minerals or other materials as alumina. Alumina is very widely disseminated in nature, the commonest form of occurrence being as a silicate, of which clays and feldspar are the best known. "Corundum" (q.v.) is a pure crystalline form. Among the other alumina minerals are andalusite, bauxite, alunite, diaspore, cryolite, alunogen, aluminite (websterite), chrysoberyl. Alumina is very refractory; fusion point, about 3,600°F.; point of deformation about cone 42. For the chemical product see Aluminum oxide.

Aluminite (Websterite) $Al_2O_3SO_3.9H_2O$ or $(AlO)_2SO_4.9H_2O$.
A natural hydrated sulfate of alumina. Color, white; streak, same; dull or earthy luster. Contains 29.6% Al_2O_3, 23.3% SO_3, balance water.
Constants: Sp.gr. 1.66; hardness 1 to 2.
Occurrence: Germany, England, France, Bohemia.

Aluminium. See Aluminum.

Aluminum (Aluminium) Al.
A silvery, ductile metal.
Constants: Sp.gr. 2.708; m.p. 657° C.
Soluble in acids and alkalis; insoluble in water.
Derivation: By the electrolysis of the oxide in a bath of molten cryolite (a naturally occurring fluoride of sodium and aluminum).
Corrosion resistance: Aluminum sold under the trade designation of Aluminum 2S [99.2% Al (99.9+% available Al)] is resistant at room temperatures to dilute sulfuric acid (up to 10%), and all concentrations of nitric and acetic acids and ammonium hydroxide.
Forms available: Bar; bolts and nuts; busbar; cable; conduit; die castings; foil; forgings; grained ingot; granulated ingot; ingot; molding; nails; permanent mold castings; pipe fittings; plate; powder; rivets; rod; sand castings; screws; screw machine products; sheet, coiled, flat and corrugated; structural shapes; tubing; wire.
Uses:

Architectural Applications: Balustrades, columns, conduit, coping tiles, cornices, cresting, doors, down spouts and gutters, electric light and fixtures and chandeliers, entrances, window frames and sashes, fascias, flood light brackets, frames and pendants, grille work, hardware, kick plates, marquises, newel posts, ornamental fences, panels, pilasters, radiators and covers, risers and treads, saddles, scuppers, sheet roofing, shingles, skylight frames, spandrels, stair railing, statuary, store front work and facing, thresholds, Venetian blinds, ventilators and ventilating ducts, window casements, window sills.

Chemical and Pharmaceutical Applications: Agitators, autoclaves, baffles, belts, blow cases, caps and seals, chemical balances, chutes, coils, collapsible tubes, condensers, containers, conveyors, coolers, crystallizers, culture pans, curing pans, dephlegmators, digesters, distilled water distributing systems, dryer belts, dryers, evaporators, fans, filling machines, filters, fittings, gas scrubbers, heating coils, hoppers, jacketed kettles, kettles, laboratory apparatus, linings, mixers, paint pigment, pipe lines, pots, pumps, rayon equipment, retorts, screens, shipping drums, stills, tank cars, tank trucks, tanks, trays, trucks, vacuum pans, valves, vats.

Dairy Applications: Aging equipment, cans, coils, coolers, cream separators, dump tanks, filling machinery, filters, fittings, forewarming tanks, heaters, holding tanks, hoppers, milker pails, milking machines, paint pigment, pasteurizers, pipe lines, pumps, ripeners, tanks, tank trucks, trucks, vacuum pans, valves, vats, weight cans.

Electrical Applications: Battery eliminator parts, busbar, cable, cable connections, contacts, discs, electrode holders, electrodes, electrolytic condensers, fixed condensers, fixtures, fuse wire, lamp receptacles, lead wires, lightning arrester trays, loud speaker diaphragms, loud speakers, magnetic coils, meter covers, radio chassis, radio panels, radio shields, rectifier parts, switch buttons, telephone equipment, variable condensers, wire.

Food Industry: Bins, canning equipment, caps and seals, chutes, collapsible tubes, containers, conveyors, cooking coils, cooking kettles, evaporators, filling machines, filters, fittings, foil, hoppers, jacketed kettles, kettles, mason jar caps, meat cutting machines, mixers, paint pigment, pans, percolators, pipe lines, pumps, range accessories, ranges, refrigeration equipment, screens, storage tanks, stove pipe, strainers, table tops, trays, trucks, utensils, vacuum pans, valves, vats, waffle irons, weighing machine parts.

Metallurgical Applications: Alloys, burner parts, deoxidizing agent, flask equipment, match plates, oven linings, precipitating agent, recording instruments, reducing agent.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Oil Industry: Bubble caps, busbar, cable, coatings, condensers, conduit, drums, gages, heat exchangers, nails, paint pigment, pipe lines, pumps, screws, swing lines, tank cars, tank trucks, tanks, tubing.

Paper Industry: Conduit, conveyors, dryers, paint pigment, rolls for fourdrinier tables, section boxes, tubing.

Rubber Industry: Bins, conduit, curing pans, electrodes, filler, heat manifolds, mandrels, markers, molds, paint pigment, vulcanizing pans.

Transportaton Industry: Underframe, body members, power plant and accessories for automobiles, buses, trucks, railway coaches, street cars, freight cars, tank cars; many parts of the trucks on street cars; wings, fuselage, power plant, fittings and accessories of airplanes; structural members, covering, power, plant and accessories for airships; Diesel engine parts; outboard motor parts.

Aluminum Acetate (Lemeet; Waterproofing salts).
(a) normal $Al(C_2H_3O_2)_3$;
(b) basic $Al(C_2H_3O_2)_2OH$.
Color and properties: Amorphous, white powder.
Soluble in water.
Derivation: By the interaction of aluminum hydroxide and acetic acid. The product is recovered by crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.; also sold in solution.
Containers: Wooden barrels; boxes; drums; carboys (solutions).
Uses: Waterproofing cloth; fireproofing fabrics; mordant in textile dyeing; preparation of lakes; embalming fluids; medicine (astringent and antiseptic); calico printing.
Railroad shipping regulations: None.*
See also Mordant rouge.

Aluminum Acetotartrate. See Alsol.

Aluminum Alloy 3S. A non-ferrous alloy containing 98% aluminum and 1.25% manganese. It offers resistance to cold sulfuric acid up to 10% concentration, having substantially the same corrosion-resistant properties to sulfuric acid as pure aluminum but possesses higher strength. It is also resistant to all concentrations of cold nitric acid, acetic acid and ammonium hydroxide.

Aluminum-ammonium Sulfate (Ammonia alum; Burnt alum).
$Al_2(SO_4)_3(NH_4)_2SO_4.24H_2O$.
Color and properties: Colorless crystals; strong astringent taste.
Constants: Sp.gr. 1.645; m.p. 94.5° C.
Soluble in water; insoluble in alcohol.
Derivation: By crystallization from a mixture of ammonium and aluminum sulfates.
Method of purification: Recrystallization.
Grades: Technical, lump, ground, powdered; C.P.; U.S.P.
Containers: 100, 112 lb. kegs; 200 lb. bags; 350 (lump), 400 lb. barrels; bulk shipments.
Uses: Medicine (astringent and emetic); mordant in dyeing; in water and sewage purification; sizing paper; tanning; clarifying agent; ingredient in baking powder.
Railroad shipping regulations: None.*

Aluminum-beta-naphthol-disulfonate. See Alumnol.

Aluminum Borate $2Al_2O_3.B_2O_3.H_2O$.
Color and properties: White, granular powder.
Soluble in water; insoluble in alcohol and ether.
Derivation: By the interaction of aluminum hydroxide and boric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1 lb. bottles; wooden barrels.
Uses: Glass and ceramic industries.
Railroad shipping regulations: None.*

Aluminum Borotartrate. See Boral.

Aluminum Bromide $Al_2Br_6.12H_2O$.
Color and properties: White to yellowish, deliquescent crystals.
Constants: M.p. 93° C.
Soluble in water, alcohol and carbon bisulfide.
Derivation: By passing bromine over heated aluminum.
Method of purification: Crystallization.
Grades: Technical.
Containers: Air-tight drums; sealed glass vials.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Aluminum Bronze. A non-ferrous alloy containing 88 to 96.1% copper, 2.3 to 10.5% aluminum, and small amounts of iron and tin. It offers good resistance to dilute hot or cold solutions of sulfuric acid, acetic acid in the absence of air, hot or cold sodium hydroxide up to 50%, and sea water.

Aluminum Carbide Al_4C_3.
Color and properties: Greenish-gray, pulverized mass; decomposes in water with liberation of methane.
Constants: Sp.gr. 2.36.
Derivation: By heating aluminum oxide and coke in an electric furnace.
Grades: Technical.
Containers: Iron drums.
Uses: Generating methane.
Fire hazard: Dangerous. Keep dry!
Railroad shipping regulations: None.*

Aluminum Chlorate. See Mallebrein prophylacticum.

Aluminum Chloride (a) Al_2Cl_6; (b) $Al_2Cl_6.12H_2O$.
Color and properties: Yellowish-white, granular crystals; sublimes readily.
Constants: M.p. 190° C.
Soluble in water, ether and alcohol.
Derivation: (a) By calcining crude bauxite ore in a rotary kiln at 1,800° F. The dried bauxite is mixed with coal in ratio of 3 parts bauxite to one of coal, pulverized and briquetted. It is then heated to 1,500° F. to drive off hydrocarbons and moisture and chlorinated in a furnace at 1,600° F. (b) By crystallizing the anhydrous form from hydrochloric acid solution.
Impurities: Ferric chloride; titanium chloride; silicon chloride; basic aluminum chloride.
Grades: Technical anhydrous; technical crystals; crystalline hydrated; C.P. crystals; N.F.
Containers: Air-tight drums; sealed glass vials.
Uses: Catalytic agent; petroleum refining; Friedel and Craft's reaction in organic synthesis; medicine (external astringent and antiseptic).
Railroad shipping regulations: None.*

Aluminum Fluoride $Al_2F_6.7H_2O$.
Color and properties: White crystalline powder.
Soluble in water.
Derivation: Action of hydrofluoric acid on aluminum hydroxide and subsequent recovery by crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; barrels.
Uses: Ceramics (production of white enamel); repressant of side fermentations in alcoholic fermentation.
Railroad shipping regulations: None.*

Aluminum Hydrate. See Aluminum hydroxide.

Aluminum Hydroxide (Aluminum trihydrate; Hydrated alumina; Precipitated oxide of aluminum) $Al(OH)_3$.
Color and properties: White, gelatinous precipitate.
Constants: Variable with the composition.
Insoluble in water.
Derivation: By fusing bauxite with soda ash. The melt (sodium aluminate) is dissociated with

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

hot water and the aluminum hydroxide is precipitated by passing in a stream of carbon dioxide.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 25, 50, 100 lb. kegs; 90, 100, 200, 400 lb. barrels.
Uses: Dyeing mordant; water purification; waterprofing fabrics; manufacture of lakes; filtering medium; chemicals (manufacture of aluminum salts); glass manufacture; ceramic glazes; lubricating compositions.
Railroad shipping regulations: None.*

Aluminum Iodide AlI_3.
Color and properties: Brown, crystalline pieces.
Constants: M.p. 185° C.; b.p. 360° C.
Soluble in water.
Derivation: By heating aluminum oxide and iodine in a sealed tube.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron canisters.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Aluminum Nitrate
(a) $Al(NO_3)_3$; (b) $Al(NO_3)_3.9H_2O$; (c) $Al(NO_3)_3.18H_2O$.
Color and properties: White crystals.
Constants: (b) M.p. 73° C.; Decomposes at 134° C.
Soluble in cold water; decomposes in hot water.
Derivation: Formed by the action of nitric acid on aluminum and crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden barrels.
Uses: Textiles (mordant in printing with alizarin red); leather tanning and finishing; manufacture of electrical incandescent filaments.
Railroad shipping regulations: Yellow label.

Aluminum Oleate $Al(C_{18}H_{33}O_2)_3$.
Color and properties: Yellowish-white mass.
Insoluble in water.
Derivation: By heating aluminum hydroxide, water and oleic acid. The resultant mixture is filtered and dried.
Grades: Technical.
Containers: Barrels.
Uses: Waterproofing; dryer for paints, etc.; thickener for lubricating oils.
Railroad shipping regulations: None.*

Aluminum Oxide (Alumina) Al_2O_3.
Color and properties: White powder.
Constants: Sp.gr. 3.73; m.p. 2,020° C.
Soluble in concentrated sulfuric acid; insoluble in water.
Derivation: By calcining aluminum hydroxide.
Grades: Technical; C.P.
Containers: 1, 5, 25, 50 lb. cans; wooden barrels.
Uses: Aluminum metal; abrasives; laboratory crucibles; refractory tubes, etc.
Railroad shipping regulations: None.
See also Aloxite, Alundum, Borolon, Corundum, and Ruby.

Aluminum Palmitate $Al(C_{15}H_{42}O_4)_3$.
Color and properties: Yellowish-white mass.
Insoluble in water.
Derivation: By heating aluminum hydroxide and palmitic acid and water. The resultant mixture is filtered and dried.
Grades: Technical.
Containers: Wooden barrels.
Uses: Waterproofing leather, paper, textiles; thickener for lubricating oils; production of high gloss on leather; ingredient of varnishes; production of high gloss on paper.
Railroad shipping regulations: None.*

Aluminum Phenolsulfonate (Aluminum sulfocarbolate; Sozal) $Al_2(C_6H_4HSO_4)_6$.
Color and properties: Reddish-white powder with slight phenol odor.
Soluble in water and alcohol.
Uses: Medicine (substitute for iodoform, unofficial).
Railroad shipping regulations: None.*

Aluminum Phosphate $AlPO_4$.
Color and properties: White crystals.
Constants: Sp.gr. 2.54.
Insoluble in water and alcohol.
Derivation: By the interaction of solutions of aluminum sulfate and sodium phosphate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Ceramics.
Railroad shipping regulations: None.*

Aluminum-potassium Sulfate (Potash alum; Alumen, U.S.P.; Burnt alum) $Al_2(SO_4)_3K_2SO_4.24H_2O$.
Color and properties: White crystals.
Constants: Sp.gr. 1.7571; m.p. 105° C.
Soluble in water; insoluble in alcohol.
Derivation: Alunite (q.v.) is roasted in reverberatory furnaces. The melt is leached and the salt recovered by crystallization.
Grades: Technical; lump; ground; powdered; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 100 to 112 lb. kegs; 200 lb. bags; 300, 350, 400 lb. barrels; 600 lb. casks; bulk shipments.
Uses: Medicine (astringent, styptic); dyeing (mordant); baking powder; textiles; paper.
Railroad shipping regulations: None.*

Aluminum Resinate $Al(C_{44}H_{63}O_5)_3$.
Color and properties: Brown mass.
Insoluble in water.
Derivation: By heating of aluminum hydroxide and rosin.
Grades: Technical (fused, precipitated).
Containers: Fused: 300 lb. barrels. Precipitated: 100 to 125 lb. barrels.
Uses: Dryer for varnishes.
Railroad shipping regulations: None.*

Aluminum Rhodanide. See Aluminum sulfocyanate.

Aluminum Salicylate. See Salumin.

Aluminum Salicylate, Ammoniated.
Color and properties: Yellow powder.
Soluble in water.
Uses: Medicine (nose and throat infections, catarrh, ozena, etc., unofficial).
Railroad shipping regulations: None.*

Aluminum Silicate. Chief constituent of kaolin (q.v.).

Aluminum-silicon 43. A non-ferrous alloy containing 95% aluminum and 5% silicon. It offers good resistance to atmospheric attack inland and near salt water.

Aluminum-sodium Acetate. See Acetonal.

Aluminum-sodium Sulfate. See Sodium-aluminum sulfate.

Aluminum Solder. An alloy of aluminum, silver, tin and zinc.

Aluminum Stearate $Al(C_{18}H_{35}O_2)_3$.
Color and properties: Yellowish mass.
Insoluble in water.
Derivation: By heating aluminum acetate and sodium stearate together. The product is filtered and dried.
Grades: Technical.
Containers: Wooden barrels.
Uses: Waterproofing; ingredient of lubricants; cutting compounds; paint and varnish drier.
Railroad shipping regulations: None.*

Aluminum Subformate. See Alformin.

Aluminum Subgallate. See Gallal.

Aluminum Sulfate (Known in the trade as Alum; Pearl alum; Pickle alum) (a) $Al_2(SO_4)_3$; (b) $Al_2(SO_4)_3.18H_2O$.
Color and properties: White crystals.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants:	(a)	(b)
Specific-gravity	2.71	1.62
Melting-point	Decomposes at 770° C.	Decomposes

Soluble in water; insoluble in alcohol.
Derivation: By treating pure kaolin or aluminum hydroxide with sulfuric acid. The insoluble silicic acid is removed by filtration and the sulfate is obtained by crystallization.
Grades: Iron-free; technical; N.F.; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 200, 400 lb. barrels; bulk in carloads.
Uses: Tannage of white leather; sizing paper; lakes; alums; mordant for dyeing; water purification; fireproofing cloth; anhydrous salt; catalyst in manufacture of ethane; waterproofing agent for concrete; clarifying agent in stearin candle manufacture; clarifying agent for fats and oils; ingredient of lubricating compositions; manufacture of satin white; deodorizer and decolorizer in petroleum refinery processes; precipitating agent in sewage-treating plants.
Railroad shipping regulations: None.*

Aluminum Sulfocarbolate. See Aluminum phenolsulfonate.

Aluminum Sulfocyanate (Aluminum sulfocyanide; Aluminum rhodanide) $Al(SCN)_3$.
Color and properties: Yellowish powder.
Soluble in water; insoluble in alcohol and ether.
Derivation: Aluminum cyanide is boiled with sulfur.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron drums.
Uses: Textile industry.
Railroad shipping regulations: None.*

Aluminum Sulfocyanide. See Aluminum sulfocyanate.

Aluminum Tannate.
Color and properties: Light brown powder.
Derivation: By the interaction of aluminum acetate and tannic acid.
Grades: Technical.
Containers: Tins.
Uses: Antiseptic.
Railroad shipping regulations: None.*

Aluminum Trihydrate. See Aluminum hydroxide.

Alumnol (Aluminum beta-naphtholdisulfonate) $Al_2[C_{10}H_5(OH)(SO_3)_2]_3$.
Color and properties: White powder, darkens slightly on exposure to air. Its solutions are incompatible with albumin, gelatin solutions, silver salts, soluble nitrates, caustic alkalis, alkaline carbonates.
Soluble in cold water and glycerol; slightly soluble in alcohol. Coagulates albumin, but soluble in excess.
Uses: Medicine (astringent and antiseptic, catarrhal inflammations, nasal, urethral, etc., gonorrhea, abscesses, with starch for laryngitis, and skin diseases, caustic solution for wounds, unofficial).
Railroad shipping regulations: None.*

Alundum. Trade mark for a line of fused-alumina refractory and abrasive products.
Grains. Raw material. Available in all standard mesh sizes for refractory purposes and for increasing alumina content in ceramic bodies. Two degrees of purity are: Regular alundum 95% Al_2O_3 and small amounts titania, iron and silica. No. 38 Alundum, white, containing 99% Al_2O_3 and traces of soda, iron, titania and silica.
Physical characteristics: Sp.gr. 3.93 to 4.01; fusion point 2,000° to 2,050° C. depending on purity; coefficient of thermal expansion 0.0000072; mean specific heat (25° to 100°C.) 0.1827 to 0.200 gram calories per gram per degree C.
Cements. Clay-bonded mixtures with maturing temperatures from 600° to 1,800° C. for imbedding electrical resistors and general high temperature work, refractory brick setting, etc.
Refractory Shapes. Bonded fused-alumina shapes of great variety for very high temperature work both commercially and experimentally; high heat conductivity, chemically stable. Do not conduct electricity. Used for all types of furnaces, bricks, plates, muffles, tunnel kilns, enameling furnaces, tubes, laboratory ware. Alundum refractories can be used at temperatures up to 1,700° C. depending upon service conditions.

Alunite (Alum stone) $K_2Al_6(OH)_{12}(SO_4)_4$ or $KAl_3(SO_4)_2(OH)_6$.
A natural hydrated basic sulfate of aluminum and potassium. Color, white, gray or reddish; streak, white; vitreous to pearly luster. Often impure from admixture with silica or clayey matter. Composition is also variable due to partial replacement of the potassium by sodium and grades from kalioalunite (0.33 to 1.12% Na_2O, 5.68 to 10.46% K_2O) to natroalunite (6.83% Na_2O, 1.04% K_2O). Alunite analyzes 34.4 to 38.46% Al_2O_3, 22.09 to 38.34% SO_3, 1.92 to 19.34% SiO_2, 12.90 to 17.60% H_2O.
Constants: Sp.gr. 2.58 to 2.75; hardness 3.5 to 4.
Occurrence: United States (Utah, California, Colorado, Nevada), Italy, Hungary, Greece, France, Japan, Australia, Spain.
Uses: Chemicals (potash, alums); millstones; fertilizer.

Alunogen.
$Al_2(SO_4)_3.18H_2O$ or $Al_2O_3.3SO_3.18H_2O$.
A natural sulfate of aluminum occurring as a delicate fibrous crust on shales and other rocks. Sometimes also found massive. Color, white or yellow; streak, white, yellowish or reddish; vitreous or silky luster. Contains 15.3% Al_2O_3, 36.0% SO_3, balance water.
Constants: Sp.gr. 1.6 to 1.8; hardness 1.5 to 2.
Occurrence: United States (New Mexico, Colorado), Bohemia, Germany, Austria, Italy, Elba.

Alva Marina.
Derivation: A prepared seaweed.
Grades: Technical.
Containers: Large bags.
Uses: By upholsterers for stuffing chairs, sofas and mattresses.
Railroad shipping regulations: None.*

Alypin (2-Benzoxy-2-dimethylaminomethyl-1-dimethylaminobutane hydrochloride)
$CH_3CH_2CC_6H_5COOCH_2N(CH_3)_2CH_2N(CH_3)_2.HCl$.
Color and properties: White, crystalline powder, odorless, bitter taste; hygroscopic.
Soluble in water, alcohol, chloroform; insoluble in ether.
Uses: Medicine for a local anesthetic, unofficial.
Railroad shipping regulations: None.*

Amalgam.
Brittle, silver-white mineral of bright metallic luster. An alloy of mercury with one or more metals, but more specifically a native compound of silver and mercury in which the percentage of silver ranges from 27.5 to 95.8. Frequently found in mercury mines in small amounts and occasionally in silver deposits. Formulas range from Ag_2Hg_3 to $Ag_{36}Hg$. Native gold amalgams carrying 39 to 42.6% gold have also been found.
Constants: Sp.gr. 13.75 to 14.1; hardness 3 to 3.5.
Occurrence: Germany, Sweden, Norway, France, Spain, Chile, Canada.

Amaranth. A coal-tar dye giving a deep red shade.

Amazonite (Amazon stone).
A gem stone which is a green variety of microline (See Feldspar). The most valuable kinds are

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

apple green in color. The lighter green kinds and those with streaks and specks of yellowish-white or red are of no commercial importance.
Occurrence: United States (North Carolina, Virginia, Colorado), Russia.

Amazon Stone. See Amazonite.

Amber (Fossil resin).
A fossil resin derived from an extinct variety of pine which flourished in the Tertiary Period. Strand amber comes from stratum partly below sea level. It is obtained either by dredging or is picked up off the beach after it has been uncovered and washed out by the action of the waves. Baltic amber is mined. Its color is pale yellow, grading to brown or reddish-brown and it varies from transparent to opaque. The transparent variety contains up to 4% and the opaque variety up to 8% succinic acid. Hence the term "Succinite".
Occurrence:
Strand. Sicily, Holland, England and other European shores.
Baltic. Mined in East and West Prussia.
Uses: Beads, ornaments, mouthpieces for pipes and cigarette holders, varnish.

Ambergris.
Color and properties: Irregular, gray, grayish-brown or black, streaked or mottled, waxy, opaque masses; peculiar odor.
Derivation: Morbid concretion from the intestinal tract of the sperm whale.
Grades: Technical.
Containers: Wooden boxes.
Uses: Perfumes (fixative); drugs; soap manufacture.
Railroad shipping regulations: None.*

Amber Oil.
Color and properties: Colorless or brown, thin, liquid, volatile oil; darkens with age; empyreumatic, balsamic odor.
Chief constituents: Phenols.
Constants: Sp.gr. 0.915 to 0.975.
Soluble in alcohol, ether, chloroform, carbon bisulfide, fixed oils.
Derivation: From amber, by destructive distillation and redistillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine (treatment of hysteria and whooping cough; skin irritant).
Railroad shipping regulations: None.*

Amber Seed. See Abelmoschus.

Amblygonite $Li(AlF)PO_4$ or $AlPO_4.LiF$.
A natural fluophosphate of aluminum and lithium. Color, white to pale greenish-, bluish-, yellowish-, grayish- or brownish-white; white streak; vitreous to pearly luster. Contains 10.1% lithia, sometimes with partial replacement by sodium.
Constants: Sp.gr. 3.01 to 3.09; hardness 6.
Occurrence: United States (California, Maine, Connecticut), Germany, Norway, France.
Uses: An important source of lithium.

Ambrac A. A non-ferrous alloy containing 75% copper, 20% nickel and 5% zinc. It offers good resistance to cold sulfuric acid up to 95% concentration and to hot sulfuric acid up to 50% in absence of oxidizing agents. It is also resistant under certain conditions to hydrochloric acid, in the absence of air to acetic acid, to sodium hydroxide, sea water, and chlorine in aqueous solution. It offers fair resistance to moist sulfurous atmospheres.

Ambrette. See Abelmoschus.

Ambrette-seed Oil, Liquid.
Color and properties: Liquid oil of musk-like odor, freed of the odorless fatty acid.
Constants: Sp.gr. 0.905 to 0.917 at 15° C.; optical rotation slightly dextrogyrate, up to + 1° 20′, or rarely levogyrate up to −2° 24′; index of refraction 1.474 to 1.480; acid value 0.8 to 2.5; ester value 137 to 190.
Solubility in alcohol: In 2.5 to 8 vols. and more of 80% alcohol.
Derivation: By distilling the seeds of Hibiscus abelmoschus.
Uses: Perfumery.
Railroad shipping regulations: None.*
See also Ambrette-seed oil, ordinary.

Ambrette-seed Oil, Ordinary.
Color and properties: Concrete mass resembling orris oil.
Constants: Sp.gr. 0.891 at 40°C., 0.883 at 50°C.; acid value 75 to 140; ester value 70 to 130.
Derivation: By distilling the seeds of Hibiscus abelmoschus.
See also: Ambrette-seed oil, liquid.
Railroad shipping regulations: None.*

Ambrite.
Color and properties: Yellowish-gray, greasy, amorphous, oxygenated hydrocarbon.
Insoluble in ether, benzene, chloroform.
Derivation: Occurs in masses in Auckland, New Zealand.

Ambrosia Oil. Red oil with geraniol odor, distilled from seed of Chinopodium ambrosioides, native to South America. Used in perfumery.

Ambrosine.
Yellowish to clove-brown resin found in the phosphatic beds near Charleston, S. C.

American Ashes. See Potassium carbonate.

American Hellebore. See Veratrum.

American Indian Hemp. See Apocynum.

American Ipecac. See Gillenia.

American Saffron. See Carthamus.

American Spikenard. See Aralia.

American Valerian. See Cypripedium.

American Vermilion. See Chrome red.

Amethyst.
A purple or bluish-colored form of native silica or quartz (q.v.).
Uses: Gem stone.
For oriental amethyst see Corundum.

Amianthus. See Asbestos.

Amides. See Amines.

Amido. See Amino.

Amidol. Trade name for diaminophenol hydrochloride (q.v.); a photographic developer.

Amidopyrine. See Pyramidone.

Aminoacetanilide, Para- $NH_2C_6H_9NHOCCH_3$.
Color and properties: Colorless crystals.
Constants: M.p. 162° C.
Soluble in water, alcohol and ether.
Derivation: Acetylization of para-phenylenediamine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Intermediates; azo dyes.
Railroad shipping regulations: None.*

Aminoacetic Acid (Glycocoll; Methyl glycocoll; Aminoethanoic acid)
$COOH\ CH_2\ NH_2$.
Color and properties: White crystals.
Constants: Sp.gr. 1.1607; m.p. 232° to 236° C.
Soluble in water; insoluble in alcohol and in ether.
Derivation: By the action of concentrated ammonium hydroxide on monochloroacetic acid, or by the action of alkali on gelatin.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; kegs.
Uses: Organic synthesis; medicine.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Aminoacetyl-para-phenetidine Hydrochloride. See Phenocoll hydrochloride.

Aminoanthraquinone $C_{14}H_9O_2NH_2$.
(a) 1-Amino; (b) 2-Amino.
Color and properties: (a) Red, iridescent needles. (b) Red or orange-brown needles.
Constants: M.p.: (a) 256° C.; (b) 302° C.; b.p.: Sublimes.
Slightly soluble in alcohol; soluble in chloroform, benzene and acetone.
Derivation: By reduction of nitroanthraquinones, or by substituting the amino radical direct in nitro-, halogen- or oxyanthraquinones.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: (a) For manufacture of dyes (cyananthrol and alizarin blue, etc.). (b) For manufacture of dyes (indanthrene and flavanthrene, etc.).
Railroad shipping regulations: None.*
See also Diaminoanthraquinones.

Aminoazobenzene (Aminodiphenylimide, para-; Phenylazoaniline) $NH_2C_6H_8N_2C_6H_5$.
Color and properties: Yellow crystals.
Constants: M.p. 127.4° C.; b.p.: Below 360° C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: (1) Diazoaminobenzene when heated with aniline hydrochloride, yields aminoazobenzene. The aniline hydrochloride acts as a catalyzer and does not enter into the reaction. (2) Nitration of azobenzene followed by reduction.
Method of purification: Crystallization.
Grades: Technical.
Containers: Barrels; kegs.
Uses: Dyes (chrysoidine dyes, induline dyes, solid yellow and acid yellow dyes); coloring spirit varnishes (chlorohydrate derivative); coloring food products.
Railroad shipping regulations: None.*

Aminoazobenzene-beta-naphthol (Sudan red III) $C_6H_5NNC_6H_4NNC_{10}H_6OH$.
Color and properties: Brown powder.
Insoluble in water; soluble in alcohol.
Derivation: By heating aminoazobenzene and beta-naphthol.
Method of purification: Crystallization from alcohol.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Coloring oils red.
Railroad shipping regulations: None.*

Aminoazobenzene Hydrochloride
$NH_2C_6H_4N_2C_6H_5HCl$.
Color and properties: Steel-blue crystals.
Soluble in alcohol; slightly soluble in water.
Derivation: By passing dry hydrochloric acid gas into a solution of aminoazobenzene.
Method of purification: Crystallization.
Grades: Technical.
Containers: Barrels; kegs.
Uses: Dyes; coloring lacquers.
Railroad shipping regulations: None.*

Aminoazotoluene Hydrochloride
$(CH_3C_6H_4)_2N_2.HCl$.
Color and properties: White crystals.
Soluble in water, alcohol and ether.
Derivation: By the interaction of aminoazotoluene and dry hydrochloric acid gas.
Method of purification: Crystallization.
Grades: Technical.
Containers: Barrels; kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Aminoazotoluene, Ortho- $CH_3C_6H_4N_2C_6H_3NH_2CH_3$.
Color and properties: Reddish-brown crystals.
Constants: M.p. 102° C.
Soluble in alcohol, ether, oils and fats; slightly soluble in water.
Derivation: From ortho-toluidine by treatment with nitrite and muriatic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Kegs and barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Aminobenzene. See Aniline.

Aminobenzenesulfonic Acid, Meta-. See Metanilic acid.

Aminobenzenesulfonic Acid, Para-. See Sulfanilic acid.

Aminobenzenyl-ortho-aminothiocresol. See Dehydrothio-para-toluidine.

Aminobenzoic Acid, Meta- (Benzaminic acid) $C_6H_4NH_2CO_2H$.
Color and properties: Yellowish crystals; sublime easily; sweet taste.
Constants: Sp.gr. 1.5104; m.p. 173° to 174° C.
Soluble in water, alcohol and ether.
Derivation: By the reduction of meta-nitrobenzoic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Starting point in manufacture of azo dyes.
Railroad shipping regulations: None.*

Aminobenzoic Acid, Ortho-. See Anthranilic acid.

Aminobenzoic Acid, Para- (Aminodracylic acid) $NH_2C_6H_4CO_2H$.
Color and properties: Light buff crystals; white when pure.
Constants: M.p. 186° to 187° C.
Soluble in water, alcohol and ether.
Derivation: Reduction of para-nitrobenzoic acid.
Method of purification: Not purified.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes and pharmaceuticals.
Railroad shipping regulations: None.*

Aminobenzoic Acid Propyl Ester, Para- See Propaesin.

Aminobenzoyldiethylaminoethane, Para- (Procaine base; Novocaine base).
$C_6H_4NH_2COOCH_2CH_2N(C_2H_5)_2$.
Color and properties: White, stable, granular powder; odorless.
Soluble in alcohol, ether, chloroform, benzene, fixed and volatile oils; insoluble in water.
Uses: Medicine (same as for the hydrochloride).
Railroad shipping regulations: None.*

Aminobenzoyldiethylaminoethanol Hydrochloride, Para- (Ethocaine; Novocaine; Syncaine; Kerocaine; Procaine; Procaine hydrochloride) $C_6H_4NH_2COOCH_2CH_2N(C_2H_5)_2.HCl$.
Color and properties: Small, colorless crystals or white, crystalline powder; odorless.
Constants: M.p. 153° to 156° C.
Soluble in water and in alcohol at 25° C.; slightly soluble in chloroform; almost insoluble in ether.
Derivation: (a) By heating chloroethyl-para-nitrobenzoic ester with diethylamine for 24 hours under pressure at 120° C. The product is then reduced with tin and hydrochloric acid. (b) By condensation of ethylene chlorohydrin with diethylamine. The chloroethyldiethylamine formed is heated with sodium para-aminobenzoate.
Uses: Medicine (valuable anesthetic for introdermal, neural or spinal anesthesia).
Railroad shipping regulations: None.*

Aminobenzoyl-diethylaminoethanol Nitrate, Para- (Diethylaminoethyl-para-aminobenzoate nitrate, beta-; Procaine nitrate; Novocaine nitrate) $C_6H_4NH_2COOC_2H_4N(C_2H_5)_2.HNO_3$.
Color and properties: Small, colorless crystals; odorless.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: M.p. 100° to 102° C.
Soluble in water, alcohol.
Uses: Medicine (similar to uses of procaine hydrochloride, q.v., unofficial).
Railroad shipping regulations: None.*

Aminobenzoyldimethylamino-1:2-dimethylpropanol Hydrochloride, Para-. See Tutocain.

Aminobenzoyldimethylaminomethylbutanol Hydrochloride, Para-. See Tutocain.

Aminobenzoylformic Acid, Ortho-. See Isatin.

Aminobenzoyl-gamma-dinormal-butylaminopropanol Sulfate, Para-. See Butyn.

Aminobenzoyl J Acid.
Color and properties: White crystalline product.
Soluble in alkaline solutions; insoluble in alcohol, ether and water.
Derivation: Condensation of J acid and para-nitrobenzoylchloride followed by reduction.
Method of purification: Filtration of alkaline solution.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Aminodimethylaniline, Para- (Dimethyl-para-phenylenediamine) $C_6H_4NH_2N(CH_3)_2$.
Color and properties: Colorless, asbestos-like, long needles; stable in air when pure. If impure, the crystals liquefy.
Constants: M.p. 41° C.; b.p. 257° C.
Soluble in water, alcohol and benzene.
Derivation: By reduction of para-nitrosodimethylaniline with zinc dust and hydrochloric acid. The aminodimethylaniline is not isolated, but the solution is worked up.
Method of purification: Recrystallization from mixture of benzene and ligroin.
Grades: Technical.
Containers: Kegs.
Uses: Base for production of methylene blue; photo developer; reagent for detection of hydrogen sulfide.
Railroad shipping regulations: None.*

Aminodimethylbenzene. See Xylidine.

Aminodiphenylimide, Para-. See Aminoazobenzene.

Aminodracylic Acid. See Aminobenzoic acid, para-.

Aminoethanoic Acid. See Aminoacetic acid.

Aminoform. See Hexamethylenetetramine.

Amino-G Acid. See 2-Naphthylamine-6:8-disulfonic acid.

Amino-J Acid. See 2-Naphthylamine 5:7-disulfonic acid.

Aminomercuric Chloride. See Mercuric ammonium chloride.

Amino-meta-xylene. See Xylidine.

4-Amino-1-naphthalenesulfonic Acid. See Naphthionic acid.

1-Amino-8-naphthol-2:4-disulfonic Acid (Chicago acid; SS acid; 2S acid) $C_{10}H_9NO_7S_2$.
Color and properties: Gray; white when pure.
Soluble in water and sodium hydroxide solution.
Derivation: Fusion 1:8-naphthasultam-2:4-disulfonic acid with caustic potash.
Method of purification: Recrystallization from water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

1-Amino-8-naphthol-3:6-disulfonic Acid (H acid) $C_{10}H_4(OH)(NH_2)(SO_3H)_2$.
Color and properties: Gray powder.
Soluble in water, alcohol and ether.
Derivation: From alpha-naphthylamine disulfonic acid S by soda fusion.
Method of purification: Crystallization.
Impurities: Chromotropic acid.
Grades: Technical, 80%, 85%.
Containers: 300, 350, 385 lb. wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

1-Amino-2-naphthol-4-sulfonic acid (1:2:4-Hydroxy acid) $C_{10}H_9NO_4S$.
Color and properties: Pinkish-white to gray needles.
Soluble in hot water; almost insoluble in cold water.
Derivation: Beta-naphthol is changed to the 1-nitroso-beta-naphthol which is treated with sodium bisulfite. Upon acidification the free sulfurous acid effects simultaneous reduction and sulfonation.
Method of purification: By washing the crude acid paste with water.
Grades: Technical.
Containers: Glass bottles; 500-800 lb. wooden barrels.
Uses: Aniline dyes; analysis (determination of phosphates and calcium).
Railroad shipping regulations: None.*

1-Amino-8-naphthol-4-sulfonic Acid (S acid) $NH_2(OH)C_{10}H_5SO_3H$.
Color and properties: Gray; white when pure.
Slightly soluble in water; insoluble in alcohol and ether.
Derivation: Fusion of 1-naphthylamine-4:8-disulfonic acid with caustic soda.
Method of purification: Precipitation from a dilute solution of its sodium salt.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Amino-2-naphthol-2-sulfonic Acid, Sodium Salt. See Eikonogen.

2-Amino-5-naphthol-7-sulfonic Acid (J acid) $C_{10}H_9NO_4S$.
Color and properties: Gray; white when pure.
Soluble in hot water, sparingly soluble in cold water.
Derivation: Fusion of beta-naphthylamine-5:7-disulfonic acid with caustic.
Method of purification: Recrystallization from hot water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Amino-8-naphthol-6-sulfonic Acid (Gamma acid) $C_{10}H_5(OH)(NH_2)(SO_3H)$.
Color and properties: White crystals.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: By heating caustic soda and beta-naphtholdisulfonic acid G and water in an autoclave.
Method of purification: Crystallization.
Grades: Technical.
Containers: 50, 100 lb. kegs; 200, 300 lb. barrels.
Uses: Starting point in manufacture of azo dyes.
Railroad shipping regulations: None.*

Amino-para-xylene. See Xylidine.

Aminophenol
(a) Ortho- $C_6H_4(NH_2)(OH)$
(b) Meta- $C_6H_4(NH_2)(OH)$
(c) Para- $C_6H_4(NH_2)(OH)$
Color and properties: White crystals. (c) Almost white to dark brown needles or plates.
Constants: M.p. (a) 170° C.; (b) 122° C.; (c) 184° C. (with decomposition?).
Slightly soluble in water, alcohol and ether.
Derivation: (a) By reduction of ortho-nitrophenol mixed with aqueous ammonia by means of a stream of hydrogen sulfide.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

(b) Fusion of meta-sulfanilic acid with caustic soda and subsequent extraction of the melt with ether.

(c) (1) By reduction of para-nitrophenol with iron filings and hydrochloric acid. (2) By electrolytic reduction of nitrobenzene in concentrated sulfuric acid and treatment with an alkali to free the base.

Method of purification: Recrystallization.

Grades: Technical; photographic; U.S.P.

Containers: (c) Glass bottles; 100 lb. wooden barrels; 100 lb. net fiber drums.

Uses: (a,b,c) Dye manufacture; (a) Hair dyeing; fur dyeing. (b) Textile printing. (c) Photographic developer; fur dyeing; hair dyeing; leather dyeing; preparation of sugar substitutes; manufacture of salophen.

Railroad shipping regulations: None.*

Aminophenol Hydrochloride, Para- $C_6H_7ON.HCl$.

Color and properties: Light-brown to white needles.

Constants: Best determined on free base (q.v.) isolated from the hydrochloride.

Soluble in water and alcohol.

Derivation: By neutralizing para-aminophenol with muriatic acid.

Method of purification: Recrystallization.

Grades: Technical; photographic.

Containers: Glass bottles; 100 lb. net fiber drums.

Uses: Dyes; photographic chemicals.

Railroad shipping regulations: None.*

Aminophenol-para-sulfonic Acid, Ortho-. See 2-Amino-1-phenol-4-sulfonic acid.

2-Amino-1-phenol-4-sulfonic Acid (Aminophenol-para-sulfonic acid, ortho-) $C_6H_3OHNH_2SO_3H$.

Color and properties: Brown crystals.

Constants: No melting point. Decomposes on heating.

Fairly soluble in hot water. Very soluble in alkaline solution.

Derivation: (a) Sulfonation and nitration of chlorobenzene followed by hydrolysis to phenol with caustic soda with subsequent reduction by sodium sulfide. (b) Sulfonation of ortho-aminophenol. (c) Sulfonation of phenol followed by nitration and reduction.

Method of purification: Recrystallization.

Grades: Technical, 97% crystals; 10% solution in sodium sulfide.

Containers: 100 lb. kegs; 250 lb. wooden barrels.

Uses: Intermediate for Schultz dyes Nos. 154, 155, 156 and 157.

Railroad shipping regulations: None.*

Aminophenylarsinic Acid, Para-. See Arsanilic acid.

Aminophenylglyoxalic Lactime, Ortho-. See Isatin.

Aminopyrine. See Pyramidone.

5-Aminosalicylic Acid $C_6H_3COOH(OH)NH_2$.

Color and properties: White crystals.

Soluble in hot water or alcohol.

Derivation: (1) From the corresponding nitrosalicylic acid by reduction. (2) By reducing the azo dye, benzeneazosalicylic acid.

Method of purification: Recrystallization from water.

Grades: Technical.

Containers: Wooden barrels.

Uses: Dyes; intermediates; manufacture of transfer paper.

Railroad shipping regulations: None.*

Aminosalicylic Acid Hydrochloride $C_6H_3COOH(OH)NH_2.HCl$.

Color and properties: Grayish-white crystals.

Soluble in water, alcohol and ether.

Derivation: By the reduction of nitrosalicylic acid with zinc and hydrochloric acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles; tins.

Uses: Medicine; manufacture of transfer paper.

Railroad shipping regulations: None.*

Aminosuccinic Acid. See Asparaginic acid.

Aminotoluene, Ortho-. See Toluidine, ortho-.

Aminotoluenyl-ortho-aminothioxylenol. See Dehydrothioxylidine.

Aminoxylene, Meta-, Ortho-, Para-. See corresponding Xylidene.

Aminoxylol. See Xylidene.

Ammo-Phos.

A proprietary brand of artificial fertilizer stated to be marketed in two forms: 13/48 grade, 13% ammonia and 48% available phosphoric acid; 20/20 grade, 20% ammonia and 20% available phosphoric acid.

Ammo-Phos-Ko. High analysis complete fertilizer said to analyze as follows:

No. 1 grade—12% nitrogen (14.5% ammonia), 24% phosphoric acid, 12% potash; Ratio 1-2-1. No. 2 grade—10% nitrogen (12.1% ammonia), 20% phosphoric acid, 15% potash; Ratio 1-2-1.5. No. 3 grade—10% nitrogen (12.1% ammonia), 30% phosphoric acid, 10% potash; Ratio 1-3-1. No. 4 grade—12% nitrogen (14.5% ammonia), 12% phosphoric acid, 12% potash; Ratio 1-1-1.

Ammonia. Strictly, a gas, NH_3 (See Ammonia, anhydrous). Commonly, the solution of this gas in water (See Ammonium hydroxide). Ammonium sulfate, the commonest salt, is sometimes referred to as "ammonia".

Ammonia, Anhydrous (Liquid ammonia) NH_3.

Colorless gas, extremely pungent odor; liquefied by compression.

Soluble in water.

Grades: Technical; pure.

Containers: 50, 100, 150 lb. steel cylinders; 50,000 lb. tank cars.

Uses: Organic preparations; refrigeration.

Railroad shipping regulations: Green gas label.

Ammonia, Aqua. See Ammonium hydroxide.

Ammonia, Household. A weak solution of ammonium hydroxide.

Ammonia, Liquid. See Ammonia, anhydrous.

Ammonia Liquor (Gas liquor; Ammoniacal liquor).

Derivation: A condensed watery solution obtained in the destructive distillation of a bituminous coal in gas or coke manufacture, composed of ammonia and ammonium compounds, and containing sulfuretted hydrogen and cyanogen.

Uses: Production of anhydrous ammonia, aqua ammonia (ammonium hydroxide), ammonium sulfate and other ammonium salts: as a source of ammonia in the Solvay process for producing soda ash.

Grades: Technical.

Containers: Tank cars.

Railroad shipping regulations: None.*

Ammonia Oils. A name sometimes given to the oils used for lubricating ammonia compressor cylinders. See Ice-machine oils.

Ammonia, Synthetic. See Nitrogen Fixation.

Ammoniac (Ammoniac gum).

Color and properties: Irregular, rounded tears; peculiar odor; sweetish-bitter, somewhat acrid taste.

Derivation: Gum resin from stems of perennial herb, Dorema ammoniacum.

Habitat: Persia, northern India and southern Siberia.

Grades: Technical.

Containers: Bags.

Uses: Medicine (stimulant, expectorant, cathartic, diuretic); as ingredient of porcelain cements; perfumes.

Railroad shipping regulations: None.*

Ammoniac, Oil of.

Color and properties: Dark yellow essential oil; pronounced odor of the gum together with a suggestion of that of angelica.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 0.8875 to 0.891; optical rotation + 1° 37′; refractive index, 1.47250 to 1.4808; acid value 3.7; ester value 40.5, after acetylation 106.4.
Solubility in alcohol: In 0.5 vol. and more of 90% alcohol.
Derivation: Distilled from gum ammoniac.
Uses: Medicine.
Railroad shipping regulations: None.*

Ammoniacal Liquor. See Ammonia liquor.

Ammoniated Mercury Chloride. See Mercuric ammonium chloride.

Ammoniated Mercury Nitrate. See Mercurous oxide, black.

Ammoniated Ruthenium Oxychloride. See Ruthenium red.

Ammonio-cupric Sulfate. See Copper-ammonium sulfate.

Ammonio-ferric Citrate. See Ferric-ammonium citrate.

Ammonio-ferric Oxalate. See Ferric-ammonium oxalate.

Ammonio-ferric Sulfate. See Ferric-ammonium sulfate.

Ammonio-formaldehyde. See Hexamethylenetetramine.

Ammonium Acetate $NH_4(C_2H_3O_2)$.
Color and properties: White, hygroscopic, crystalline mass.
Constants: M.p. 89° C.
Soluble in water.
Derivation: By the interaction of glacial acetic acid and ammonia gas.
Method of purification: Crystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes and jars; 100 lb. kegs; 400, 450 lb. barrels.
Uses: Reagent in analytical chemistry; drug; textile dyeing.
Railroad shipping regulations: None.*

Ammonium, Aqua. See Ammonium hydroxide.

Ammonium Arsenate $(NH_4)_2HAsO_4$.
Color and properties: White crystals or powder, efflorescing in air with loss of ammonia.
Soluble in water.
Derivation: Interaction of arsenic acid with ammonia.
Grades: C.P.
Containers: 1 lb. bottles.
Uses: Medicine (diseases of the skin, unofficial).
Railroad shipping regulations: Class B poison.

Ammonium Benzoate $C_6H_5COONH_4$.
Color and properties: White crystals or powder.
Constants: M.p.: Decomposes at 193° C.
Soluble in water, alcohol and glycerol.
Derivation: By the action of ammonium hydroxide on benzoic acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: 1 oz., ¼, 1 lb. bottles; 1, 5 lb. cans.
Uses: Medicine (urinary antiseptic); food preservative.
Railroad shipping regulations: None.*

Ammonium Bircarbonate NH_4HCO_3.
Color and properties: White crystals.
Constants: Sp.gr. 1.586; m.p.: Decomposes at 36° to 60° C.
Soluble in water; insoluble in alcohol.
Derivation: By heating ammonium hydroxide with an excess of carbon dioxide, and evaporation.
Method of purification: Recrystallization.
Impurities: Ammonium carbonate.
Grades: Technical; C.P.
Containers: ¼, 1 lb. bottles; 5, 25 lb. cans; 25 lb. boxes; 100 lb. kegs; 300 lb. barrels.
Uses: Production of ammonium salts; dyes; substitute for yeast in baking; ingredient of fire-extinguishing compounds; pharmaceuticals; degreasing textiles.
Railroad shipping regulations: None.*

Ammonium Bichromate (Ammonium dichromate) $(NH_4)_2Cr_2O_7$.
Color and properties: Yellow needles; explodes in contact with many substances.
Constants: Sp.gr. 2.153; m.p.: Decomposes.
Soluble in water.
Derivation: Action of chromic acid on ammonium hydroxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Various bottles and cartons; 25 lb. boxes; 100 lb. kegs.; 250 lb. barrels.
Uses: Mordant for dyeing; manufacture of alizarine; chrome alum; smokeless sporting powders; oil purification; pickling candle wicks; leather tanning; synthetic perfumes; photography; process engraving; lithographic work.
Railroad shipping regulations: None.*

Ammonium Bifluoride $(NH_4)FHF$.
Color and properties: White crystals.
Constants: Sp.gr. 1.211.
Soluble in cold water; decomposes in hot water.
Derivation: Action of ammonium hydroxide on hydrofluoric acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: 100 lb. kegs; 110, 220 lb. casks; 300 lb. barrels.
Uses: Ceramics; chemical reagent; etching glass (white acid); sterilizer for brewery, dairy and other equipment.
Railroad shipping regulations: None.*

Ammonium Binoxalate $(NH_4)HC_2O_4.H_2O$.
Color and properties: Colorless crystals.
Constants: Sp.gr. 1.556.
Soluble in water.
Derivation: Action of ammonium hydroxide on oxalic acid with subsequent crystallization.
Grades: Technical; pure.
Containers: Glass bottles.
Uses: Analytical chemistry; removing ink stains from fabrics.
Railroad shipping regulations: None.*

Ammonium Bisulfate NH_4HSO_4.
Color and properties: White crystals.
Soluble in water.
Grades: C.P.
Containers: 1, 5 lb. bottles.
Uses: Medicine (treatment of gastric affections, unofficial).
Railroad shipping regulations: None.*

Ammonium Bisulfite NH_4HSO_3.
Color and properties: White crystals.
Soluble in water.
Grades: C.P.
Containers: 1, 5 lb. bottles.
Uses: Medicine (treatment of dyspepsia and skin diseases, unofficial).
Railroad shipping regulations: None.*

Ammonium Bitartrate (Acid ammonium tartrate) $(NH_4)HC_4H_4O_6$.
Color and properties: White crystals.
Constants: Sp.gr. 1.680.
Soluble in water, acids and alkalis; insoluble in alcohol.
Derivation: By the action of ammonium hydroxide on tartaric acid.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; barrels.
Uses: Baking powder.
Railroad shipping regulations: None.*

Ammonium Borate. $NH_4HB_4O_7.3H_2O$.
Color and properties: Colorless crystals; efflorescent with loss of ammonia.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 2.38 to 2.95.
Soluble in water.
Derivation: By the action of ammonium hydroxide on boric acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Medicine (treatment of urinary calculi); fireproofing compounds.
Railroad shipping regulations: None.*

Ammonium Bromide NH_4Br.
Color and properties: Colorless crystals or white powder.
Constants: Sp.gr. 2.327; m.p.: Sublimes.
Soluble in water, alcohol.
Derivation: Action of hydrobromic acid on ammonium hydroxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; pure; C.P.; U.S.P.
Containers: Domestic: ¼, 1 lb. bottles; ¼, 5, 25, 50, 100 lb. boxes; 450 lb. barrels. Imported: 50, 100 lb. kegs; 100 lb. cases.
Uses: Precipitating silver salts for photographic plates; medicine (for its bromine ion); analytical chemistry; process engraving; lithographic work.
Railroad shipping regulations: None.*

Ammonium Camphorate $NH_4HC_{10}H_{14}O_4 . 3H_2O$.
Color and properties: White crystalline powder.
Soluble in water.
Used in medicine for its solvent action, unofficial.
Railroad shipping regulations: None.*

Ammonium Carbamate (Ammonium carbaminate) $NH_4HCO_3NH_4CO_2$.
Color and properties: White, crystalline powder; exceedingly volatile; the "anhydride" of ammonium carbonate.
Constants: M.p.: Sublimes.
Soluble in water.
Derivation: By the interaction of dry ammonia gas and carbon dioxide. Is recovered from gas liquor with the ammonia and ammonium carbonate.
Grades: Technical.
Containers: Iron drums.
Uses: Production of ammonium carbonate.
Railroad shipping regulations: None.*

Ammonium Carbaminate. See Ammonium carbamate.

Ammonium Carbazotate. See Ammonium picrate.

Ammonium Carbonate (Ammonia crystal; "Hartshorn," a mixture of ammonium acid carbonate and ammonium carbamate). $(NH_4)HCO_3 . (NH_4)(NH_2)CO_2$.
Color and properties: Colorless crystal plates; unstable in air, being converted into the bicarbonate.
Constants: M.p. 85° C.
Soluble in water; decomposes in hot water, yielding ammonia and carbon dioxide.
Derivation: Ammonium salts are heated with calcium carbonate.
Grades: Technical; lumps; cubes; powder; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 5, 10, 25, 100 lb. kegs; 250, 375, 500 lb. barrels; 500 lb. casks.
Uses: Ammonium salts; medicine (cardiac stimulant, antacid, expectorant); baking powders; smelling salts; rubber manufacture; manufacture of casein colors; casein glues and other adhesives; tanning; cleansing powders; fire extinguishing compounds; pharmaceuticals; textiles (mordant, washing fabrics); fermentation accelerator in wine manufacture.
Railroad shipping regulations: None.*

Ammonium Chloride (Sal ammoniac; Ammonium muriate) NH_4Cl.
Color and properties: (a) Crystallized: White. (b) Sublimed: Grayish with fibrous structure.
Constants: Sp.gr. 1.520; m.p.: Volatilizes.
Soluble in water and glycerol.
Derivation: (1) By the action of ammonia or ammonium salts on hydrochloric acid. (2) By neutralizing "galvanizers' pickle" (consisting mainly of ferrous chloride) with ammonia. (3) As a by-product of the ammonia-soda process (see Soda ash and Sodium bicarbonate). (4) By the action of ammonia on calcium chloride solution.
Method of purification: (a) Crystallization. (b) Sublimation (sal ammoniac).
Grades: Technical (lumps or granulated); C.P.; U.S.P.
Containers: Lump: 100 lb. kegs; 250, 350 lb. barrels; 500 lb. casks. Granulated: 25 lb. boxes; 100 lb. kegs; 200, 250, 300 lb. barrels; 500, 700 lb. casks; C.P. and U.S.P.: 1, 5 lb. bottles; 1, 5 lb. cans; 25 lb. kegs.
Uses: Medicine (similar to the carbonate); dry batteries; soldering flux; textile printing; manufacture of various ammonia compounds, etc.; dyes; fertilizer; tanning; manufacture of rust cement for pipe joints; pickling agent in zinc coating and tinning; electroplating; candle manufacture; washing powders.
Railroad shipping regulations: None.*

Ammonium Chloride, German Synthetic.
A nitrogen fertilizer prepared from German synthetic ammonia. It is a yellowish-brown salt containing 24% nitrogen.
Railroad shipping regulations: None.*

Ammonium Chloroplatinate. See Platinum-ammonium chloride.

Ammonium Chromate $(NH_4)_2CrO_4$.
Color and properties: Yellow crystals.
Constants: Sp.gr. 1.866; m.p. 185° C.
Soluble in cold water.
Derivation: By the addition of ammonium hydroxide to a solution of ammonium bichromate; recovery by crystallization.
Method of purification: Recrystallization.
Impurities: Bichromates.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; barrels; boxes.
Uses: Mordant in dyeing; photography (sensitizer for gelatin coatings).
Railroad shipping regulations: None.*

Ammonium Citrate $(NH_4)_3C_6H_5O_7$.
A salt formed by neutralizing citric acid with aqua ammonia used in solution to determine the available phosphoric acid in acid phosphate and mixed fertilizers.

Ammonium Cuprate.
Derivation: A cold aqueous solution of copper sulfate is treated with the exact amount of caustic soda, below 20° C., to produce a blue precipitate. This is washed repeatedly with distilled water, pressed to remove most of the water and dissolved in ammonium hydroxide.
Uses: Waterproofing fabrics.

Ammonium Crystals. See Ammonium carbonate.

Ammonium Dichromate. See Ammonium bichromate.

Ammonium Diphosphate. See Ammonium phosphate.

Ammonium Fluoride NH_4F.
Color and properties: White crystals.
Soluble in cold water.
Derivation: Interaction of ammonium hydroxide and hydrofluoric acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1 lb. waxed bottles; 250 lb. barrels.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Fluorides; analytical chemistry; in agriculture for improving sandy soils; antiseptic in brewing; etching glass; textile mordant.
Railroad shipping regulations: None.*

Ammonium Hydroxide (Aqua ammonium; Water of ammonia; Aqua ammonia; Ammonium hydrate) NH_4OH.
Color and properties: Colorless liquid.
Constants: B.p. 38.5° C.
Soluble in water.
Derivation: (a) The gas liquor from coke and gas manufacture is distilled, the ammonia and volatile salts are absorbed in sulfuric acid. The resultant ammonium sulfate is heated, sometimes with lime, the ammonia distilled off and collected in water. (b) Waste animal matter from abattoirs is dried and destructively distilled, ammonia being obtained. (c) Decomposition of calcium cyanamide by superheated steam. (d) See Nitrogen fixation.
Grades: Technical; C.P.; U.S.P.; 16°; 20°; 26°.
Containers: 1, 4 lb. bottles; 5, 10 gal. carboys; 55, 110 gal. drums; 8,000 gal. tank cars.
Uses: Textiles; manufacture of rayon, rubber, fertilizers; refrigeration; plastics (condensation agent for resins, accelerator in phenol condensation process); photography (development of latent images); pharmaceutical (smelling salts, aromatic spirits of ammonia, various preparations); ammonia soaps; lubricants; fireproofing wood; ink manufacture; explosives; ceramics; ammonium compounds; saponifying fats and oils; organic synthesis; detergent.
Railroad shipping regulations: None.*

Ammonium Hypophosphite $NH_4P_2O_2$
Color and properties: Colorless crystals or white powder; decomposes when heated.
Soluble in water and alcohol.
Uses: Medicine (throat diseases).
Railroad shipping regulations: None.*

Ammonium Hyposulfite. See Ammonium thiosulfate.

Ammonium Ichthynatum. See Ichthynat.

Ammonium "Ichthyolsulfonate." See Ichthyol.

Ammonium Iodide NH_4I.
Color and properties: White crystals.
Constants: Sp.gr. 2.501; m.p.: Sublimes.
Soluble in water and alcohol.
Derivation: Action of ammonium hydroxide on hydriodic acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1 oz., ¼, 1, 5, 7 lb. bottles; 25 lb. jars.
Uses: Iodides; medicine (resolvent); photography.
Railroad shipping regulations: None.*

Ammonium Meta-vanadate NH_4VO_3.
Color and properties: White.
Constants: Sp.gr. 2.326; m.p.: Breaks up at 210°C.
Insoluble in saturated ammonium chloride solution; slightly soluble in cold water.
Derivation: Alkali solution of V_2O_5 and precipitation with ammonium chloride.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Technical: Compressed paper drums. C.P.: Glass bottles.
Uses: Raw material for catalyst as V_2O_5; drier for paints and inks.
Railroad shipping regulations: None(?)*

Ammonium Molybdate $(NH_4)_2MoO_4$.
Color and properties: White, crystalline powder.
Constants: Sp.gr. 2.38 to 2.95; m.p.: Decomposes.
Soluble in acids.
Derivation: Interaction of a solution of molybdic acid and ammonium hydroxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles; boxes.
Uses: Analytical chemistry; manufacture of pigments.
Railroad shipping regulations: None.*

Ammonium Muriate. See Ammonium chloride.

Ammonium-nickel Sulfate. See Nickel-ammonium sulfate.

Ammonium Nitrate NH_4NO_3.
Color and properties: Colorless crystals; explosive!
Constants: Sp.gr. 1.725; m.p. 153° to 166° C.; b.p.: Decomposes at 210° C.
Soluble in water, alcohol and alkalis.
Derivation: By the action of ammonium hydroxide on nitric acid.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 1, 5, 25, 50 lb. boxes; 100 lb. kegs; 200-300 lb. barrels; 550 lb. casks.
Uses: Pyrotechnics; explosives; manufacture of nitrogen monoxide; "laughing gas"; fertilizer; absorbent for nitrogen oxides; ingredient of freezing mixtures.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Ammonium Nitrate-sulfate. See Ammonium sulfate-nitrate.

Ammonium Nitroso-beta-phenyl Hydroxylamine. See Cupferron.

Ammonium Oxalate $(NH_4)_2C_2O_4.H_2O$.
Color and properties: Colorless crystals.
Constants: Sp.gr. 1.502.
Soluble in water.
Derivation: Interaction of ammonium hydroxide and oxalic acid and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; pure; C.P.
Containers: ¼, 1 lb. cartons or bottles; 5, 25, 50, 100 lb. kegs.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Ammonium Perchlorate NH_4ClO_4.
Color and properties: White crystals; explosive!
Constants: Sp.gr. 1.95; m.p.: Decomposes.
Soluble in water.
Derivation: By the interaction of ammonium hydroxide and perchloric acid. Recovery by crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles; iron drums.
Uses: Explosives; pyrotechnics; analytical chemistry.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Ammonium Persulfate $(NH_4)_2S_2O_8$.
Color and properties: White crystals.
Constants: M.p.: Decomposes.
Soluble in water.
Derivation: Electrolysis of a concentrated solution of ammonium sulfate. Recovered by crystallization.
Method of purification: Recrystallization.
Grades: Technical; pure; C.P.
Containers: 1 oz., ¼, 1, 5 lb. bottles; 25 lb. boxes or jars; 100 lb. kegs.; 300 lb. barrels.
Uses: Oxidizing agent; bleaching agent; photography; oxidizing copper; electroplating; manufacture of other persulfates; deodorizing and bleaching oils; washing infected yeast.
Railroad shipping regulations: None.*

Ammonium Phosphate (Ammonium diphosphate) $(NH_4)_2HPO_4$.
Color and properties: White crystals or powder. The commercial article is a mixture of diam-

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

monium hydrogen phosphate [$(NH_4)_2HPO_4$] and ammonium dihydrogen phosphate $(NH_4)H_2PO_4$.
Constants: Sp.gr. 1.619.
Soluble in water.
Derivation: Interaction of ammonium hydroxide and phosphoric acid.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 200 lb. bags; 350 lb. barrels.
Uses: Medicine (ingredient in compound syrups); fireproofing; fertilizers.
Railroad shipping regulations: None.*

Ammonium Phosphomolybdate $2(NH_4)_3PO_4.24MoO_3.12H_2O$.
Color and properties: Yellow, crystalline powder.
Soluble in water and alkali; insoluble in alcohol and acids.
Derivation: By the interaction of ammonium molybdate and phosphoric and nitric acid.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Tins; glass bottles.
Uses: Reagent for alkaloids.
Railroad shipping regulations: None.*

Ammonium Phosphotungstate (Ammonium phosphowolframate) $2(NH_4)_3PO_4.24WO_3.xH_2O$.
Color and properties: White powder.
Soluble in water and alkali; insoluble in acid.
Derivation: By the interaction of ammonium tungstate, ammonium phosphate and nitric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Chemical reagent.
Railroad shipping regulations: None.*

Ammonium Phosphowolframate. See Ammonium phosphotungstate.

Ammonium Picrate (Ammonium carbazotate; Ammonium picronitrate) $NH_4C_6H_2(NO_2)_3O$.
Color and properties: Yellow crystals; highly explosive!
Constants: M.p.: Decomposes.
Soluble in water and alcohol.
Derivation: By the action of ammonium hydroxide on picric acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs or boxes free from metal nails or screws.
Uses: Explosives; medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: High explosive.

Ammonium Picronitrate. See Ammonium picrate.

Ammonium Salicylate $NH_4C_7H_5O_3$.
Color and properties: Colorless crystals and white powder.
Soluble in water and alcohol.
Derivation: By the action of ammonium hydroxide on salicylic acid.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: ¼, 1 lb. bottles; 5, 25, lb. cans; 100 lb. kegs; 150, 200 lb. barrels.
Uses: Medicine (internal disinfectant).
Railroad shipping regulations: None.*

Ammonium Sulfate $(NH_4)_2SO_4$.
Color and properties: Brownish-gray to white crystals according to degree of purity.
Constants: Sp.gr. 1.77; m.p. 140° C.
Soluble in water; insoluble in alcohol.
Derivation: (a) The ammoniacal vapors from the destructive distillation of coal are led into sulfuric acid, followed by crystallization and drying. This forms the crude ammonium sulfate of commerce. (b) Tankage materials high in nitrogen are heated with sulfuric acid and sodium sulfate. Caustic soda is then added in excess and the ammonia distilled over into sulfuric acid and the sulfate crystallized.
Method of purification: Recrystallization or sublimation.
Grades: Commercial; technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 200 lb. single and double bags; 300, 400 lb. barrels.
Uses: Fertilizer; ammonium hydroxide; charging electric batteries; soldering liquids; galvanizing iron; candle manufacture; fireproofing compositions.
Railroad shipping regulations: None.*

Ammonium Sulfate, Arcadian.
A special grade containing a minimum of 25.25% ammonia, equivalent to 20.75% nitrogen, and less than 0.50% moisture. Its preparation differs from that of the ordinary commercial sulfate by being specially dried and screened to remove lumps. It is used as a fertilizer and chiefly as a top dressing or for direct application. Its process of manufacture is stated to insure a perfect physical condition and a good distribution by hand or machine.
Railroad shipping regulations: None.*

Ammonium Sulfate-diammonium Phosphate, Double Salt. See Leunaphos.

Ammonium Sulfate, German Synthetic.
A nitrogen fertilizer prepared from German synthetic ammonia. It is stated to be free from substances harmful to plant life and contains 20.6% nitrogen in a gradually available and lasting form. Should be stored in a dry place where it will keep without loss of nitrogen and in good condition for any length of time.
Railroad shipping regulations: None.*

Ammonium Sulfate, Hopewell.
An American proprietary brand of nitrogen fertilizer prepared from synthetic ammonia. Sold with a minimum guarantee of N 20.5%; NH_3 25%.
Railroad shipping regulations: None.*

Ammonium Sulfate-nitrate. A double salt consisting of nearly equal parts of ammonium sulfate and ammonium nitrate developed in Germany and used as a fertilizer. See Leunasalpeter BASF.

Ammonium Sulfide $(NH_4)_2S$.
Color and properties: Yellow crystals.
Constants: M.p.: Decomposes.
Soluble in water, alcohol and alkalis.
Derivation: By the interaction of ammonium hydroxide and hydrogen sulfide.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Iron drums; tins; glass bottles.
Uses: Textile industry; photography (developers).
Railroad shipping regulations: None.*

Ammonium Sulfobituminolate. See Bituminol.

Ammonium Sulfocyanate (Ammonium sulfocyanide; Ammonium thiocyanate) NH_4SCN.
Color and properties: Colorless, deliquescent crystals.
Constants: Sp.gr. 1.3057; m.p. 159° C.
Soluble in water and alcohol.
Derivation: By boiling an aqueous solution of ammonium cyanide with sulfur or polysulfides.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. jars; 100, 110 lb. kegs.
Uses: Analytical chemistry; chemicals (potassium cyanides, thiourea, guanidine sulfocyanate); fertilizers; photography; ingredient of freezing solutions; coating zinc grayish-black; textiles.
Railroad shipping regulations: None.*

Ammonium Sulfocyanide. See Ammonium sulfocyanate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ammonium Tartrate $(NH_4)_2C_4H_4O_6$.
Color and properties: White crystals.
Constants: Sp.gr. 1.601.
Soluble in water.
Derivation: By the action of tartaric acid on ammonium hydroxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; barrels; boxes.
Uses: Textile industry.
Railroad shipping regulations: None.*

Ammonium Thiocyanate. See Ammonium sulfocyanate.

Ammonium Thiosulfate (Ammonium hyposulfite) $(NH_4)_2S_2O_3$.
Color and properties: Colorless crystals.
Soluble in water.
Derivation: The waste sulfite liquors from the Le Blanc soda process are treated to produce calcium thiosulfate. A solution of this is boiled with ammonium sulfate, filtered, concentrated and crystallized.
Grades: Technical; pure.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ammonium Tungstate (Ammonium wolframate) $(NH_4)_2W_2O_{13} \cdot 8H_2O$.
Color and properties: White powder.
Soluble in water; insoluble in alcohol.
Derivation: Interaction of ammonium hydroxide and tungstic acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Preparation of ammonium phosphotungstate and other tungsten compounds.
Railroad shipping regulations: None.*

Ammonium Valerianate. See Ammonium valeriate.

Ammonium Valeriate (Ammonium valerianate) $NH_4C_5H_9O_4$.
Color and properties: Colorless or white crystals; nauseating odor; must be kept well stoppered.
Constants: M.p.: Decomposes.
Soluble in water, alcohol and ether.
Derivation: By the interaction of ammonium hydroxide and valeric acid with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.; N.F.
Containers: 1, 5 lb. glass bottles.
Uses: Medicine (nerve sedative).
Railroad shipping regulations: None.*

Ammonium Vanadate. See Ammonium meta-vanadate.

Ammonium Wolframate. See Ammonium tungstate.

Amosite. See Asbestos.

Ampco Metal. A ferrous alloy containing 80 to 90% copper, 8 to 10% aluminum and 6 to 7% iron. It is resistant to dilute sulfuric acid, 10% acetic acid and sodium hydroxide up to 35%.

Amphibole Asbestos. See Asbestos.

Amphotropin. See Hexamethylenetetramine camphorate.

Amygdala Amara (Bitter almond).
The ripe seed of a species of Prunus amygdalus, native to the sub-tropical Orient, cultivated in the Mediterranean countries. Used as a source of bitter almond oil.

Amygdala Amara Oil. See Almond oil, bitter.

Amygdala Dulcis, U.S.P. (Sweet almond).
The ripe seed of a species of Prunus amygdalus, found principally in Spain, Italy, France and southern California. The Jordan or edible nut of commerce.

Amygdalic Acid (Phenylhydroxyacetic acid; Amygdalinic acid; Phenylglycolic acid; Benzoglycolic acid; Mandelic acid, para-) $C_6H_5CH(OH)COOH$.
Color and properties: Large, transparent crystals.
Constants: M.p. 118° C.
Soluble in ether; slightly soluble in water; insoluble in alcohol.
Derivation: From benzaldehyde and acetophenone dibromide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Amygdalinic Acid. See Amygdalic acid.

Amygdophenine (Mandelyl-para-phenetidine; Phenetidine amygdolate).
$C_6H_4OC_2H_5NHCOCHOHC_6H_5$.
Color and properties: Light, crystalline, grayish-white powder.
Constants: M.p. 140.5° C.
Difficultly soluble in water.
Derivation: By the action of mandelic acid upon para-phenetidine in presence of dehydrating agents.
Uses: Medicine (analgesic for neuralgia, spinal sclerosis, antirheumatic, unofficial).
Railroad shipping regulations: None.*

Amyl Acetate (Isoamyl acetate; Banana oil; Amylacetic ether; Pear oil) $CH_3CO_2C_5H_{11}$.
Color and properties: Colorless liquid; pear- or banana-like odor.
Constants: Sp.gr. 0.8659; b.p. 148° C.; wt. per gal. 7.17 lbs.
Boiling range:
At or below 110° C. not over 15%.
At or below 120° C. not over 30%.
At or below 130° C. not over 55%.
At or below 140° C. at least 80%.
Above 155°C. none.
Boiling range (high test):
At or below 110° C. none.
At or below 120° C. not over 10%.
At or below 130° C. not over 40%.
At or below 140° C. at least 60%.
Above 155° C. none.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: By adding sulfuric acid to a mixture of amyl alcohol and acetic acid with subsequent recovery by distillation.
Method of purification: Redistillation.
Grades: Technical.
Containers: 5 gal. cans; 5, 10, 50, 100 gal. drums.
Uses: Preparation of flavoring compounds; solvent for nitrocellulose; in the preparation of lacquers and photographic and motion picture films; waterproofed varnishes; waterproofing compounds; bronzing liquids; metallic paints; perfumery; solvent for tannins; artificial leather; artificial pearls; solvent for camphor; the combustible in the standard lamp used in photometry; solvent in manufacture of celluloid and celluloid cements; rayon; dyeing, printing and finishing textile fabrics.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Amylacetic Ether. See Amyl acetate.

Amyl Alcohol, Active (Amyl hydrate; Secondary butylcarbinol) $C_2H_5CH_3CHCH \cdot OH$.
Color and properties: **Clear colorless liquid.**
Constants: Sp.gr. 0.8169; b.p. 128° C.; weight per gal. 6.8 lbs.
Soluble in water, alcohol and ether.
Derivation: (1) By fractional distillation of fusel oil; (2) By fractional distillation of pentasol (q.v.).
Grades: Technical.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Glass bottles; 1, 5, 10, 50, 100 gal. drums.
Uses: Organic synthesis; solvent.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Amyl Alcohol, Fermentation. See Fusel Oil.

Amyl Alcohol, Iso-. See Isoamyl alcohol.

Amyl Alcohol, Primary Normal (Butylcarbinol, normal; 1-Pentanol) $CH_3(CH_2)_4OH$.
Color and properties: Colorless liquid; mild odor,
Constants: Sp.gr. 0.8168; b.p. 138° C.; weight per gal. 6.8 lbs.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: Fractional distillation from pentasol (q.v.).
Grades: Technical.
Containers: 1, 5, 10, 50, 100 gal. drums.
Uses: Raw material for certain pharmaceutical preparations.
Railroad shipping regulations: None.*

Amyl Alcohol, Secondary Normal. See Diethylcarbinol and Methylpropylcarbinol.

Amyl Alcohol, Tertiary (Amylene hydrate; Dimethylethylcarbinol) $(CH_3)_2C(OH)C_2H_5$.
Color and properties: Colorless liquid; camphor-like odor; more viscous than secondary amyl alcohols; in sleep-producing properties similar to chloral hydrate.
Constants: Sp.gr. 0.8144; m.p. —12° C.; b.p. 101.5° C.; weight per gal. 6.75 lbs.
Soluble in water, alcohol and ether.
Derivation: (1) From amylene by the indirect action of water in the presence of sulfuric acid. (2) By fractional distillation of pentasol (q.v.).
Grades: Technical.
Containers: Glass bottles: 1, 5, 10, 50, 100 gal. drums.
Uses: Solvents; fruit essences; organic syntheses; dry cleaning reagent.
Railroad shipping regulations: None.*

Amylase. Diastase (q.v.).

Amyl Butyrate. See Isoamyl butyrate.

Amylene (Beta-isoamylene; Valerene; Pental; Pentene; Trimethylethylene) $(CH_3)_2CCHCH_3$.
Color and properties: Colorless, mobile, inflammable liquid; disagreeable odor; readily polymerized.
Constants: Sp.gr. 0.666; b.p. 37° to 42° C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: (a) By the action of zinc chloride on amyl alcohol and agitation of first portion of distillate with sulfuric acid. (b) An impure product is separated in the manufacture of pintsch gas.
Method of purification: Rectification.
Grades: Technical; pure.
Containers: Tin cans; glass bottles.
Uses: Local anesthetic.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Amylene Carbamate. See Aponal.

Amylene Hydrate. See Amyl alcohol, tertiary.

Amyl Ether. See Amyl oxide.

Amyl Formate. See Isoamyl formate.

Amyl Hydrate. See Amyl alcohol.

Amyl Hydride. See Pentane.

Amylic Compounds. See corresponding amyl compounds.

Amylic Ether. See Amyl oxide.

Amylit. A trade name for diamalt compound, an enzymic product that is used for desizing in the textile industry.

Amyl Nitrite (Isoamyl nitrite).
Color and properties: A clear, yellowish liquid, of peculiar ethereal, fruity odor and pungent, aromatic taste. It is volatile even at low temperatures and is inflammable. According to the United States Pharmacopoeia it contains not less than 80% of $C_5H_{11}NO_2$.
Constants: Sp.gr. 0.865 to 0.875 at 25° C.
Soluble in alcohol; almost insoluble in water.
Derivation: By the interaction of amyl alcohol and nitrous acid.
Grades: U.S.P.
Containers: Dark amber glass bottles.
Uses: Medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Amylodextrin. See Starch, soluble.

Amyloform (Formamylum).
An odorless, non-toxic, non-irritant starch-formaldehyde compound which can be heated to 180° C. without decomposing.
Uses: Medicine (substitute for iodoform, principally as a dusting powder for wounds and infected ulcers, unofficial).
Railroad shipping regulations: None.*

Amyloid. A gelatinous hydrate produced when cellulose is converted into dextrose by the action of concentrated sulfuric acid and the solution diluted with water as soon as made.

Amylon. Maltose (q.v.).

Amyl Oxide (Amyl ether; Amylic ether; Diamyl ether) $(C_5H_{11})_2O$.
Color and properties: Yellowish liquid; unpleasant odor.
Constants: Sp.gr. 0.7745; b.p. 169° to 172° C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating amyl alcohol with iodine and distilling.
Grades: Technical.
Containers: Tins.
Uses: Solvent.
Fire hazard: Dangerous.*
Railroad shipping regulations: None(?)*

Amyl Salicylate $C_7H_5O_3C_5H_{11}$.
Color and properties: Colorless to yellowish liquid; aromatic odor.
Constants: Sp.gr. 1.045; b.p. 268° to 273° C.
Soluble in alcohol, chloroform and ether; insoluble in water.
Derivation: By adding sulfuric acid to a mixture of isoamyl alcohol and salicylic acid and subsequent recovery by distillation.
Method of purification: Redistillation.
Grades: Technical.
Containers: 1, 2, 5 lb. bottles; 5, 10, 25-lb. cans; 50, 100 lb. carboys.
Uses: Perfumery (fixing agent); flavoring extracts; medicine (treatment of rheumatism).
Railroad shipping regulations: None.*

Amylum, U.S.P. See Starch.

Amyl Valerianate. See Amyl valeriate.

Amyl Valeriate ("Apple essence"; "Apple oil"; Amyl valerianate; Isoamylvalerate) $C_4H_9CO_2C_5H_{11}$.
Color and properties: Clear liquid; odor of apples when diluted with alcohol.
Constants: Sp.gr. 0.8812; b.p. 203.7° C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By adding sulfuric acid to a mixture of amyl alcohol and valeric acid. Subsequent recovery by distillation.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: Iron drums; glass bottles.
Uses: Medicine (treatment of nervous conditions); fruit essences.
Railroad shipping regulations: None.*

Amyrol. Mixture of alcohols occurring in West Indian santalwood oil.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Anacardium (Cashew gum).
Hard yellowish-brown gum.
Partly soluble in water.
Derivation: Exudation from the bark of the Cashew nut tree, Anacardium occidentale, growing in tropical America.
Uses: Sometimes used by bookbinders.

Analcime. See Zeolites.

Analgen. See Ethoxybenzoylaminoquinoline.

Analgesine. See Antipyrine.

Ananas Oil (Essence of pineapple oil).
An alcoholic solution of ethyl butyrate. Used in flavoring rum and confectionery.
Railroad shipping regulations: None.*

Anarcotine. An alkaloid found in Indian opium and thought to be impure narcotine (q.v.).

Anatomical Alloys. See table under Fusible metals.

Andalusite $Al(AlO)SiO_4$.
A natural silicate of aluminum. Color, flesh-red, rose-red, violet, white, pearl-gray, pale green, reddish-brown; streak, uncolored or white; vitreous luster.
Constants: Sp.gr. 3.16 to 3.20; hardness 7 to 7.5.
Occurrence: United States (Maine, New Hampshire, Massachusetts, Connecticut, Pennsylvania), Spain, Austria, Saxony, Bavaria, Brazil, Australia.
Uses: The best varieties are used as gem stones; the chief constituent of sillimanite refractories, laboratory ware and spark plug cores; also used in super refractories.
See also Sillimanite and Cyanite.

Andesine. See Feldspar.

Andradite. See Garnet.

Anemonin (Pulsatilla camphor) $C_{10}H_8O_4$.
Color and properties: Yellowish-white crystals.
Soluble in hot alcohol.
Derivation: Separation from the volatile oil of pulsatilla.
Uses: Medicine (treatment of asthma and pulmonary affections, unofficial).
Railroad shipping regulations: None.*

Anesin. See Chloretone.

Anesthesia Ether. See Ether.

Anesthesin. See Ethyl-para-aminobenzoate.

Anethole (Anise camphor; Para-methoxypropenylbenzene; Para-allylphenylmethylic ether) $C_3H_5C_6H_4(OCH_3)$.
Color and properties: Colorless, crystalline mass; liquid at ordinary temperature.
Constants: M.p. 21° to 22° C.; b.p. 232° to 234° C.
Soluble in alcohol, chloroform and ether; very slightly soluble in water.
Derivation: From anise and fennel oils by crystallization.
Method of purification: Rectification.
Grades: Technical; N.F.
Containers: 1, 5 lb. bottles; 5, 10 lb. tins.
Uses: Flavoring compounds; source of aubepine; perfume in manufacture of dentifrices; flavoring pharmaceuticals; color photography (sensitizer in color-bleaching process).
Railroad shipping regulations: None.*

Anethum (Dill; Dill seed).
Derivation: Fruit of garden dill, Anethum graveolens.
Habitat: Asia Minor and Europe; cultivated in United States.
Grades: Technical.
Containers: Bags.
Uses: Medicine (aromatic); condiment.
Railroad shipping regulations: None.*

Anethum Oil. See Dill oil.

Angel Red. A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Angelic Acid (Angelicic acid; Angelinic acid) $CH_2CHCH(CH_3)COOH$.
Color and properties: Colorless needles or prismatic crystals; spicy odor.
Constants: Sp.gr. 0.9539; m.p. 45° C.; b.p. 185° C.
Soluble in alcohol, ether and hot water.
Derivation: From the root of Angelica archangelica or from the oil of Anthemis nobilis by distillation.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Medicine; flavoring extracts.
Railroad shipping regulations: None.*

Angelica (Garden angelica). Root and seed of the biennial herb, genus Angelica.
Habitat: Europe, Asia, eastern United States.
Grades: Technical; N.F.
Containers: Boxes; bags.
Uses: Medicine (aromatic); candy; food ingredient; source of angelica root oil; rectification of alcohol and distilled liquors.
Railroad shipping regulations: None.*

Angelica Oil, Terpeneless.
Concentration: About 20 times that of the ordinary angelica oil.
Constants: Sp.gr. about 0.951; optical rotation about — 3°.
Solubility in alcohol: 2.5 parts per 100 parts of 70% alcohol; 85 parts per 100 parts of 80% alcohol.
Railroad shipping regulations: None.*
See also Essential oils, terpeneless and sesquiterpeneless.

Angelica Root Oil, European.
Color and properties: Essential oil. A limpid liquid, colorless when freshly distilled, becoming yellowish to brownish on exposure to light and air. Strong aromatic odor; spicy taste.
Chief known constituents: Phellandrene; valeric acid.
Constants: Sp.gr. 0.853 to 0.918; optical rotation +16° to +41°; refractive index 1.477 to 1.488; acid value to 3.8; ester value 12 to 37, after distillation 51 to 75.
Solubility in alcohol: In 0.5 to 6 vols. and more of 90% alcohol (sometimes with slight turbidity).
Derivation: Distilled from the roots of Archangelica officinalis, Hoffm.
Uses: Medicine; preparation of liqueurs.
Railroad shipping regulations: None.*

Angelica Root Oil, Japanese.
Color and properties: Essential oil. Odor suggestive of musk. Odor is stronger and more persistent than that of the European oil.
Constants: Sp.gr. 0.905 to 0.908 at 15° C.; optical rotation —1° 40′; refractive index 1.49110; acid value 10.6; ester value 40.
Derivation: Distilled from the root of either Angelica refracta, Fr. Schmidt or Angelica anomala, Lall.
Uses: Medicine.
Railroad shipping regulations: None.*

Angelica Seed Oil.
Color and properties: Pale yellow essential oil; darkens with age; resembles in odor the oil from the root, but is much finer.
Chief known constituents: Phellandrene; valeric acid.
Constants: Sp.gr. 0.851 to 0.890; optical rotation +11° to +13° 30′; refractive index 1.486 to 1.489; acid value up to 2.0; ester value 13 to 30.
Solubility in alcohol: In 5 to 9 vols. of 90% alcohol (occasionally with opalescence and turbidity).
Derivation: Distilled from the seeds of Archangelica officinalis, Hoffm.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Medicine; preparation of liqueurs.
Railroad shipping regulations: None.*

Angelica Tree. See Xanthoxylum.

Angelicic Acid. See Angelic acid.

Angelinic Acid. See Angelic acid.

Anglesite $PbSO_4$.
A natural lead sulfate. White, gray, yellow, blue or green in color, sometimes colorless. Luster, adamantine to vitreous. Contains 73.6% PbO. Formed by the oxidation of galenite (q.v.) and found wherever exposed deposits of galenite occur. Slowly soluble in nitric acid.
Constants: Sp.gr. 6.12 to 6.39; hardness 3.
Occurrence: United States (Colorado, California, Arizona, Pennsylvania), Mexico, Chile, England, Hungary, Sardinia.
See also Lead sulfate.

Angostura (Carony bark; Cusparia). Bark of tree, Galipea officinalis or G. cusparia.
Habitat: Northern South America and West Indies.
Grades: Technical.
Containers: Bags.
Uses: Medicine (aromatic bitter).
Railroad shipping regulations: None.*

Angostura Bark Oil.
Color and properties: Light yellow-colored essential oil becoming darker on exposure to the air; aromatic odor and taste.
Chief known constituents: Galipol; cadinene; galipene; pinene.
Constants: Sp.gr. 0.928 to 0.96 at 15° C.; optical rotation −7° 30′ to −50°; refractive index 1.50744; acid value 1.8; ester value 5.5, after acetylation 35.7.
Solubility in alcohol: In 9 vols. of 90% alcohol (with turbidity).
Derivation: Distilled from the bark of Galipea cusparia, St. Hil.
Uses: Medicine; preparation of liqueurs and bitters.
Railroad shipping regulations: None.*

Anhalonidine $C_{12}H_{15}NO_3$.
Color and properties: White crystals; poisonous!
Constants: M.p. 154° C.
Soluble in water, alcohol and ether.
Derivation: By extraction from mescal buttons.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Anhalonine $C_{12}H_{15}NO_3$.
Color and properties: White crystals; poisonous!
Constants: M.p. 85.5° C.
Soluble in alcohol and ether.
Derivation: By extraction and subsequent crystallization from seed of mescal buttons (Anhalonium lewninii).
Method of purification: Recrystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Anhydrite $CaSO_4$.
A natural calcium sulfate usually occurring as compact granular masses of white, gray-bluish or brick-red color and resembling marble in appearance. Found mostly as layers in gypsum (q.v.) and halite (q.v.) deposits. Contains 41.2% CaO, 58.8% SO_3. Differs from gypsum in hardness and lack of hydration. Varieties are: Anhydrite of direct deposition, tripe stone, vulpinite.
Constants: Sp.gr. 2.9 to 3; hardness 3 to 3.5.
Uses: Alteration through exposure to gypsum; sometimes employed in agriculture as land plaster; ornamental stone.

Anhydroecgonine $C_9H_{13}NO_2$.
Color and properties: White crystals; poisonous!
Constants: M.p. 235° C.
Soluble in water and alcohol.
Derivation: Obtained from ecgonine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Anhydroecgonine Hydrochloride $C_9H_{13}NO_2.HCl$.
Color and properties: White crystals; poisonous!
Constants: M.p. 240° C.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on anhydroecgonine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Anhydroformaldehyde-para-toluidine $(CH_3C_6H_4N\ CH_2)_x$.
Color and properties: White, grayish- or yellowish-white powder; aromatic odor; not toxic to skin.
Constants: Sp.gr. 1.11.
Soluble in acetone.
Derivation: Reaction between formaldehyde and para-toluidine in equimolecular proportions.
Grades: Technical.
Containers: Wooden barrels.
Uses: Rubber accelerator; dyes.
Railroad shipping regulations: None.*

Aniline (Aniline oil; Phenylamine; Aminobenzene) $C_6H_5NH_2$.
Color and properties: Colorless oily liquid; rapidly becomes brown on exposure to air and light; poisonous!
Constants: Sp.gr. 1.0235; m.p. −5.96° C.; b.p. 184.4° C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By reduction of nitrobenzene with fine iron filings or borings and hydrochloric acid as a catalyzer. The aniline is recovered by distillation.
Method of purification: Redistillation.
Grades: Commercial; pure; C.P.
Containers: 1 lb. bottles; 40, 85, 500, 900 lb. drums; 60,000 lb. tank cars.
Uses: Dyes; intermediates; chemicals (aniline salts, etc.); dyeing and calico printing; vulcanization accelerator; germicide; paint and varnish; perfumery; pharmaceuticals (atoxyl, salvarsan, etc.)
Railroad shipping regulations: Class B poison.

Aniline Black. A black color developed on cotton and other textiles from a bath containing aniline hydrochloride, an oxidizing agent and a catalyzer (usually a vanadium or copper salt).

Aniline Chloride. See Aniline hydrochloride.

Aniline Hydrochloride (Aniline salt; Aniline chloride) $C_6H_5NH_2.HCl$.
Color and properties: White plates; commercial article frequently greenish in appearance.
Constants: Sp.gr. 1.2215; m.p. 198° C.; b.p. 245° C.
Soluble in water, alcohol and ether.
Derivation: (a) By passing a current of dry hydrochloric acid gas into an ethereal solution of aniline. (b) Neutralizing aniline at 100° C. with concentrated hydrochloric acid and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 180, 225 lb. barrels.
Uses: Dyes; intermediates; dyeing and printing aniline black.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

1-Aniline-2-methylanthraquinone.
Color and properties: Chocolate-brown to deep-red crystals.
Constants: Melts above 200° C.
Soluble in sulfuric acid and organic solvents such as nitrobenzene and monochloro- and dichlorobenzenes.
Derivation: From 1-chloro-2-methylanthraquinone and aniline in the presence of catalysts of copper salts and acid-binding agents like sodium carbonate, etc.
Method of purification: Crystallization from high boiling organic solvents such as nitrobenzene or from the halogenated benzenes.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Aniline Oil. See Aniline.

Aniline Red. See Fuchsin.

Aniline Salt. See Aniline hydrochloride.

Anilinesulfonic Acid, Para-. See Sulfanilic acid.

Animal Black. See under Blacks.

Animal Charcoal. See under Blacks, Animal black.

Animal Oil. See Bone oil.

Animé. See Copal.

Animi Gum (Zanzibar Gum).
Derivation: A resin found in two forms, "fossil" and "recent," on the island of Zanzibar and the adjoining African mainland.
Constants: Sp.gr. 1.062 to 1.068; m.p. 240° to 250° C.
Insoluble in most solvents.
Grades: Technical.
Containers: Bags.
Uses: Varnishes.
Railroad shipping regulations: None.*

Anisaldehyde. See Anisic aldehyde.

Anise (Anise seed).
Fruit of Pimpinella anisum.
Habitat: Western Asia, Egypt; cultivated in southern Europe, India and United States.
Grades: U.S.P. (Spanish; Star; Levant; Italian).
Containers: Bags.
Uses: Manufacture of anise oil; condiment; flavor.
Railroad shipping regulations: None.*

Anise-bark Oil.
Color and properties: Light yellow oil, with an odor reminding of safrole and estragon; spicy, slightly sweetish taste.
Chief known constituent: Methyl chavicol.
Constants: Sp.gr. 0.969.
Soluble in alcohol, ether, chloroform and benzene.
Derivation: Distilled from a bark of uncertain botanical origin from Madagascar.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Anise Camphor. See Anethole.

Anise Oil (Anise-seed oil; Illicium oil; Aniseed oil).
Color and properties: A colorless, thick liquid having the identifying characteristic of solidifying to a crystalline mass at about 15° C. Characteristic odor; very sweet taste.
Chief constituents: Anethole (90%); methylchavicol; anise ketone; acetaldehyde.
Constants: Sp. gr. 0.980 to 0.990 at 20° C.; slightly levogyrate to —1°50′; refractive index 1.557 to 1.559.
Solubility in alcohol: In 1.5 to 3 vols. of 90% alcohol.
Derivation: By distillation of the seeds of Pimpinella anisum, L.
Adulteration: Turpentine, cedar wood, copaiba, gurjun-balsam oils, fatty oils, alcohol.
Uses: As a source of anethole; medicine (carminative and to promote the flow of milk); when terpene-free in perfumery and to flavor liqueurs.
Railroad shipping regulations: None.*
See also: Anise oil, star.

Anise Oil, Star.
Color and properties: Colorless or yellowish essential oil congealing in the cold due to its anethole content; anise-like odor; pronounced sweet taste.
Chief known constituents: Anethole (85 to 90%, possibly higher); pinene; phellandrene; cymene; cineole; dipentene; limonene; terpineol; methylchavicol; hydroquinone ethyl ether; safrole; anise ketone; anisic aldehyde; anisic acid.
Constants: Sp.gr. 0.98 to 0.99 at 20° C.; optical rotation slightly levogyrate to —2° (rarely dextrogyrate to +0° 36′); refractive index 1.553 to 1.556; congealing point +15° to +18° (usually +16°, rarely +14°).
Solubility in alcohol: In 1.5 to 3 vols. and more of 90% alcohol.
Derivation: Distilled from the fruit of Illicium verum.
Adulteration: Mineral and fatty oils.
Uses: Manufacture of liqueurs.
Railroad shipping regulations: None.*

Anise Oil, Terpeneless (Aniseed oil, terpeneless).
Concentration: About 1.5 to 2 times that of the ordinary anise-seed oil.
Solubility in alcohol: 3 vols. per 100 vols. of 70% alcohol; 9 vols. per 100 vols. of 80% alcohol.
Railroad shipping regulations: None.*

Anise Seed. See Anise.

Anise-seed Oil. See Anise oil.

Aniseed Oil. See Anise oil.

Aniseed Oil, Terpeneless. See Aniseed oil, terpeneless.

Anisic Acid.
Color and properties: White crystals or powder.
Derivation: Oxidation of anethole.
Uses: Medicine (antiseptic, analgesic, antipyretic).

Anisic Aldehyde (Anisaldehyde; Aubepine; Paramethoxybenzaldehyde; Methyl-para-oxybenzaldehyde) $C_6H_4(OCH_3)CHO$.
Color and properties: Colorless liquid; aromatic odor.
Constants: Sp.gr. 1.126; m.p. —2.1°C.; b.p. 248° C.
Soluble in alcohol and ether; insoluble in water.
Derivation: Obtained from anethole by oxidation.
Method of purification: Distillation.
Grades: Technical.
Containers: 1, 5, 10 lb. bottles; 50 lb. carboys; 100 lb. drums.
Uses: Perfumery.
Railroad shipping regulations: None.*

Anisidine, Ortho- $C_6H_4OCH_3NH_2$.
Color and properties: Reddish-colored oil.
Constants: Sp.gr. 1.097 (20° C.); b.p. 217° C. (754 mm.).
Solubility: Soluble in dilute mineral acid, alcohol and ether.
Derivation: Reduction of ortho-nitroanisole with tin (or iron) and hydrochloric acid.
Method of purification: Steam distillation.
Grades: 99% (1% maximum moisture).
Containers: 55, 110 gal. drums.
Uses: Intermediate for Schultz dyes Nos. 93, 94, 95, 96 and 259.
Railroad shipping regulations: None.*

Anisole (Anisol; anisoil; methylphenyl ether) $C_6H_5OCH_3$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.988; m.p. 37.8° C.; b.p. 155° C.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in alcohol and ether; insoluble in water.

Grades: U.S.P.

Containers: 5 lb. tins; 60 lb. cases.

Uses: Solvent; perfumery; vermicide.

Ankerite.

A complex natural carbonate of calcium, magnesium and iron, sometimes also containing some manganese.

Color: White, gray or brown.

Constants: Sp.gr. 2.95 to 3.1; hardness 3.5 to 4.

Found in iron ore mines in Styria, Nova Scotia and New York.

Annabergite (Nickel bloom) $Ni_3(AsO_4)_2.8H_20$.

Pale apple-green crusts usually occurring on niccolite (q.v.) and smaltite (q.v.) resulting from weathering. Sometimes found massive. Contains 37.4% of nickel oxide. Soluble in nitric acid.

Constants: Hardness 1.

Occurrence: United States (Nevada), Silesia.

Annatto (Annotta; Arnatto; Bixine; Butter color).

Vegetable dyestuff containing coloring principle called bixin.

Derivation: From the seeds of Bixa orellana.

Habitat: South America and West Indies.

Grades: Spanish; Brazilian; French.

Containers: 100 lb. boxes.

Uses: Coloring foodstuffs (butter and cheese); dyeing orange yellow on cotton and silk (not fast).

Railroad shipping regulations: None.*

Annidalm. See Thymol iodide.

Annotta. See Anatto.

Anodynine. See Antipyrine.

Anogon (Mercurous iodobenzene-para-sulfonate).

Color and properties: Yellow, crystalline powder; contains 48.5% mercury, 30.7% iodine; used as a 10% suspension in olive oil.

Insoluble in ordinary solvents.

Uses: Medicine (intramuscular injection for syphilis, unofficial).

Railroad shipping regulations: None(?)*

Anona Oil. See Ylang-ylang oil.

Anorthite. See Feldspar.

Anorthoclase. See Feldspar.

Ansol. A proprietary name for low-boiling solvents said to be made by blending anhydrous ethyl alcohol with ethyl acetate, butanol, fusel oil and hydrocarbons in varying proportions. The various grades are adapted to use as solvents for lacquers of the nitrocellulose type, resins, nitrocottons, and as paint and varnish removers.

Ant Oil. An olive oil in which ants have been digested.

Ant Oil, Artificial. Furfural (q.v.).

Anthemidis Oil. See Chamomile oil.

Anthemis (Roman chamomile; Ground apple; Chamomile; Garden chamomile).

Dried flower heads of cultivated Anthemis nobilis.

Habitat: Southern and western Europe and United States; cultivated in Germany, Great Britain, France and Belgium.

Grades: Technical; U.S.P.

Containers: Sacks.

Uses: Medicine (aromatic bitter).

Railroad shipping regulations: None.*

Anthion. See Potassium persulfate.

Anthophyllite $(MgFe)SiO_3$.

A natural silicate of iron and magnesium, sometimes with a large percentage of aluminum. Corresponds to enstatite (q.v.), bronzite (q.v.) and hypersthene (q.v.) of the pyroxene group. Color, various shades of brown, gray or green; uncolored or gray streak; vitreous or pearly luster. See Asbestos.

Constants: Sp.gr. 3.0 to 3.2; hardness 5.5 to 6.

Occurrence: United States (North Carolina, Massachusetts, New York), Norway, Moravia, France.

Anthracene (Para-naphthalene; Anthracin; Anthracene oil; Green oil) $C_6H_4(CH)_2C_6H_4$.

Color and properties: Yellow crystals with blue fluorescence.

Constants: Sp.gr. 1.147; m.p. 216°C; b.p. 360°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: (a) By salting out from crude anthracene oil, and draining. The crude salts are purified by pressing and finally, by the use of various solvents, phenanthrene and carbazole are removed. (b) By distilling crude anthracene oil with alkali carbonate in iron retorts, the distillate containing only anthracene and phenanthrene. The latter is removed by carbon bisulfide.

Method of purification: By sublimation with superheated steam, or by crystallization from benzene followed by sublimation.

Impurities: Phenanthrene, carbazole and chrysene.

Grades: Commercial (30 to 90%).

Containers: 300 lb. bags; 100, 600 lb. drums; casks.

Uses: Dyes; alizarin; phenanthrene; carbazole; anthraquinone; calico printing.

Railroad shipping regulations: None.*

Anthracene Oil. See Anthracene.

Anthracin. See Anthracene.

Anthracite (Hard coal).

The fourth stage in the transformation of vegetable matter into coal. Anthracites are denser than bituminous coals, have a conchoidal fracture, and a high kindling temperature. They contain a large amount of fixed carbon as compared with their content of volatile matter.

Analyses of some domestic anthracites and semi-anthracites:

	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulfur	Calorific Value
	Per Cent					
Arkansas	5.19	10.49	70.31	14.01	2.05	6922
Rhode Island	2.41	4.92	73.61	19.06	0.07	6109
Indian Territory	5.11	13.65	73.21	8.03	1.18	7590
Virginia	4.80	10.12	67.05	18.03	0.63	6645
Pennsylvania	3.33	3.27†	84.25	9.13	....	7417

† In limited districts volatile matter may run as high as 8%.

Uses: Metallurgy; manufacture of producer gas and water gas; household fuel.

See also Coal.

Anthragallol (Trioxyanthraquinone) $C_{14}H_5(OH)_3O_2$.

Color and properties: Brown powder.

Constants: B.p.: Sublimes at 290° C.

Soluble in alcohol; insoluble in water.

Derivation: Obtained as a product of the reaction of benzoic, gallic and sulfuric acids.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs.

Uses: Dyeing.

Railroad shipping regulations: None.*

Anthranilic Acid (Ortho-aminobenzoic acid) $C_6H_4(NH_2)(CO_2H)$.

Color and properties: Yellowish crystals.

Constants: M.p. 144° C.

Soluble in water, alcohol and ether.

Derivation: By the treatment of phthalimide with an alkaline hypobromite solution.

Method of purification: Crystallization.

Grades: Technical (95 to 98%; 99% or better).

Containers: 10, 25 lb. tins (in cases); 100, 175, 225 lb. barrels; 50, 100 lb. drums.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Manufacture of dyes, drugs, perfumes and pharmaceuticals.

Railroad shipping regulations: None.*

Anthrapurpurin (Trihydroxyanthraquinone; Isopurpurin; Purpurine red) $C_{14}H_5O_2(OH)_3$.

Color and properties: Orange-yellow, crystalline needles.

Constants: M.p.: Above 330° C.; b.p. 462° C.

Soluble in alcohol and alkalis; slightly soluble in ether and hot water; very slightly soluble in chloroform and benzene.

Derivation: By fusion of anthraquinonedisulfonic acid with caustic soda and potassium chlorate, the melt is run into hot water and the anthrapurpurin precipitated by hydrochloric acid.

Grades: Technical; pure.

Containers: Kegs; wooden barrels.

Uses: Dyeing; organic synthesis.

Railroad shipping regulations: None.*

Anthrapurpurin Diacetyl Ester. See Purgatol.

Anthraquinone $C_6H_4(CO)_2C_6H_4$.

Color and properties: Yellow needles.

Constants: Sp.gr. 1.419 to 1.438; m.p. 284.6° C.; b.p. 380° C.

Soluble in alcohol, ether and acetone; insoluble in water.

Derivation: By oxidizing a glacial acetic solution of anthracene with alkali bichromate.

Method of purification: Crystallization.

Grades: Sublimed; 30% paste (sold on 100% basis).

Containers: Sublimed: 125 lb. barrels. Paste: 600 lb. barrels.

Uses: Intermediate.

Railroad shipping regulations: None.*

Anthraquinone-1:5-and-1:8-disulfonic Acids $C_{14}H_8O_8S_2$.

Color and properties: In their pure state trace yellow to white. The technical variety is grayish-white.

Constants: 1:5-disulfonic acid melts with decomposition at 310° to 311° C. The 1:8-isomeric form melts with decomposition at 293° to 294° C.

Soluble in water and strong sulfuric acid. The 1:8-isomer is much more soluble than the 1:5-isomer.

Derivation: Anthraquinone is sulfonated with strong oleum in the presence of mercury or mercuric oxide to a mixture of the 1:5 and 1:8 disulfonic acids which are separated by fractional crystallization.

Method of purification: Fractional crystallization from strong sulfuric acid or in form of their alkali salts from either acid or alkaline solutions.

Grades: Technical.

Containers: Wooden barrels.

Uses: Dyes.

Railroad shipping regulations: None.*

Anthraquinone-2-sodium Sulfonate (Silver salt) $C_{14}H_7O_2SO_3Na.H_2O$.

Color and properties: Silvery leaflets.

Soluble in water; insoluble in alcohol and ether.

Derivation: From anthraquinone by sulfonating with an equal weight of 45 to 50% oleum and heating up to 160° C., diluting, neutralizing with caustic soda and evaporating to crystallization.

Method of purification: Crystallization from water.

Grades: Technical.

Containers: Wooden barrels.

Uses: Dyes.

Railroad shipping regulations: None.*

Anthrarobin (Leuco-alizarin).

Yellowish-white granular powder.

Soluble in alcohol and weak alkaline solutions; sparingly soluble in chloroform and ether.

Derivation: Reduction of alizarin.

Uses: Oxidizing agent; medicine (unofficial); substitute for chrysarobin.

Anthrarufin. See 1:5-Dihydroxyanthraquinone.

Anthrasol (Colorless coal-tar).

Thin, mobile, light yellow oil obtained from pitch by distillation and from coal tar by freeing it from bases by acid treatment. The distillate is purified to remove coloring principles, and juniper tar and oil of pepperment are added. Used in medicine in treatment of skin diseases, unofficial.

Railroad shipping regulations: None.*

Antichlor. See Sodium thiosulfate.

Antidolorin. Pure ethyl chloride for narcosis.

Antifebrin. See Acetanilide.

Antiformin.

An alkaline solution of sodium hypochlorite stated to be equivalent to about 7.5% sodium hydroxide and 5.2 to 5.6% chlorine. Used in bacteriological laboratories for liquefying organic matters and dissolving bacteria; identification of tubercle bacilli in sputum.

Railroad shipping regulations: None.*

Antifriction Compositions. Mixtures of tallow, vegetable oils, soap, and a solid lubricant (such as graphite, steatite, talc, French chalk, asbestos and mica) are satisfactory for this purpose. The purpose of the solid lubricant is to continue to lubricate when the other ingredients melt and run off the bearing.

Antigorite. See under Asbestos, Serpentine asbestos.

Antimonelle. A trade name for fixing agent for basic colors. Used in place of tartar emetic.

Antimonic Acid. Approximately H_3SbO_4.

White insoluble precipitate obtained by vigorous oxidation of antimony with nitric acid or by decomposing the pentachloride with water.

Soluble in caustic potash.

Antimonine. A trade name for antimony lactate (q.v.).

Antimonite. See Stibnite.

Antimony (Antimony Regulus) Sb.

Gray metal, sometimes found native. See also Cervantite, Dyscrasite, Jamesonite, Nagyagite, Polybasite, Stibiconite and Stibnite.

Constants: Sp.gr. 6.5 to 6.86 (variously stated); m.p. 630° C.; b.p. 1,500° C.

Soluble in acids.

Derivation: Stibnite is roasted in air to remove the sulfur. The white oxide which remains is mixed with carbon and reduced with strong heat.

Grades: Technical.

Containers: ¼, 1, 5, 25, 50 lb. boxes; 100 lb. kegs; 100, 224, 250 lb. cases; 500, 1,000 lb. barrels.

Uses: Various alloys (type metal, Britannia metal, stereotype metal, bearing metal, pewter); bath tub enamels; antimony compounds.

Railroad shipping regulations: None.*

Antimony Anhydride. See Antimony oxides, pentoxide.

Antimony Blend. See Kermesite.

Antimony, Butter. See Antimony chloride.

Antimony Chloride (Butter of antimony; Antimony trichloride; Mineral butter) $SbCl_3$.

Color and properties: Colorless, transparent, crystalline mass, very hygroscopic and corrosive. Butter of antimony is a clear strongly caustic liquid with an acid reaction. Sp.gr. 1.35 = 38° Bé.

Constants: Sp.gr. 3.064; m.p. 73.2° C.; b.p. 223.5° C.

Soluble in alcohol and acids; with water forms antimony oxychloride.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the interaction of chlorine and antimony or by dissolving antimony sulfide in hydrochloric acid.
Grades: Technical; C.P.
Containers: Crystals: ¼, 1 lb. bottles. Liquid: 1, 2, 5, 7 lb. bottles; 10, 30, 50 lb. jugs; 50 lb. demijohns; 130 lb. carboys.
Uses: Antimony salts; bronzing iron; mordant; manufacturing lakes; coloring zinc black; catalyst in organic synthesis; pharmaceuticals (drug, manufacture of tartar emetic).
Railroad shipping regulations: None.*

Antimony Chloride, Basic. See Antimony oxychloride.

Antimony Cinnabar (Antimony thiosulfate) $Sb_2S_2O_3$. Found as such in nature, or prepared by treating antimony chloride with a solution of sodium thiosulfate.

Antimony Crocus (Saffron of antimony).
A substance formed during the deflagration of a mixture of equal parts of antimony trisulfide and potassium nitrate to which hydrochloric acid has been added. Fused crocus is liver-brown in color; unfused is a saffron-brown, insoluble powder containing about one-fifth trisulfide and four-fifths trioxide. Formerly used in making tartar emetic.

Antimony Fluorides
(a) Antimony trifluoride SbF_3; (b) Antimony pentafluoride SbF_5.
Color and properties: (a) Octahedral crystals. (b) Oily liquid.
Constants:

	(a)	(b)
Specific Gravity	4.379	2.990
Melting-point	292°C.	....
Boiling-point	Sublimes	....

Soluble in water and potassium fluoride.
Derivation: Direct union of antimony and fluorine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tin boxes; lead bottles.
Uses: Ceramics; mordanting cotton.
Railroad shipping regulations: None.*

Antimony Glance. See Stibnite.

Antimony Glass. A vitrified product of variable composition obtained by partial roasting and subsequent fusion of antimony trisulfide. Now seldom used.

Antimony Lactate (Antimonine) $Sb(C_3H_5O_3)_3$.
Color and properties: Tan-colored mass.
Soluble in water.
Derivation: By the interaction of antimony hydroxide and lactic acid.
Grades: Technical.
Containers: 350 lb. wooden barrels.
Uses: Mordant; textile industry.
Railroad shipping regulations: None.*

Antimony Needles. See Antimony sulfide.

Antimony Ocher.
(a) Cervantite Sb_2O_4.
(b) Stibiconite $Sb_2O_4 . H_2O$.
Pale yellow to reddish-white mineral with white streak and greasy or dull luster. Occurs as masses, crusts and powder. Both species are found together and are oxidation products of antimony deposits. The formula for cervantite has also been given as $Sb_2O_3 . Sb_2O_5$.
Constants: Sp.gr. 4.08 to 5.28; hardness 4 to 5.5.
Occurrence: Borneo, Mexico, Bohemia, Italy.

Antimony Orange. Antimony sulfide (q.v.).

Antimony Oxides (Antimony white)
(a) Trioxide Sb_2O_3; (b) Tetroxide Sb_2O_4; (c) Pentoxide Sb_2O_5.
Color and properties: White or grayish-white powder.
Constants: Sp.gr. (a) 5.2 to 5.67. (b) 4.07. (c) 3.78.
Insoluble in water, alcohol, and nitric acid.
Derivation: By oxidizing antimony with nitric acid or by combustion of antimony with a limited amount of oxygen. The trioxide is also found native as the minerals senarmontite (q.v.) and valentinite (q.v.).
Grades: Technical; U.S.P. (Trioxide); C.P. (Trioxide).
Containers: ¼, 1 lb. cartons; 5, 25 lb. boxes; 100 lb. kegs; 200 lb. bags; 500, 600 lb. casks.
Uses: Antimony salts; medicine (substitute for tartar emetic); ceramic enamels; paint pigment; decolorizing and refining agent in glass manufacture; textile mordant.
Railroad shipping regulations: None.*

Antimony Oxychloride (Algaroth powder; Antimony chloride, basic; Mercurius vitae) $SbOCl$.
Color and properties: White crystalline powder.
Soluble in hydrochloric acid; insoluble in alcohol and water.
Derivation: By the interaction of water and antimony chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Antimony salts; drug; smoke-producing substance.
Railroad shipping regulations: None.*

Antimony Oxysulfide.
Found as the mineral kermesite (q.v.); prepared artificially and used as a pigment in the rubber industry. See also Antimony, sulfurated.

Antimony Pentafluoride. See Antimony fluorides.

Antimony Pentoxide. See Antimony oxides.

Antimony-potassium Tartrate (Tartar emetic; Potassium-ammonium tartrate; Tartarized antimony; Tartrated antimony)
$K(SbO)C_4H_4O_6 . \frac{1}{2}H_2O$.
Color and properties: Colorless crystals; white powder; poisonous!
Constants: Sp.gr. 2.6.
Soluble in water, glycerol.
Derivation: By heating antimony trioxide with a solution of potassium bitartrate and subsequent crystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; wooden barrels; kegs.
Uses: Textile and leather mordant; medicine (emetic); perfumery.
Railroad shipping regulations: None.*

Antimony Red (Antimony vermilion).
A fine red pigment used for oil and water colors, also as a pigment in inner tubes. It is either antimony sulfide (q.v.) or antimony oxysulfide (q.v.).

Antimony Regulus. See Antimony.

Antimony Salt. A mixture of sodium and antimony fluorides used as a mordant.

Antimony Sulfate (Antimony trisulfate)
$Sb_2(SO_4)_3$.
Color and properties: White powder; explosive.
Constants: Sp.gr. 4.89.
Decomposes in water.
Derivation: By the action of sulfuric acid on antimony trioxide. Product obtained by crystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Explosives; pyrotechnics.
Fire hazard: (?)*
Railroad shipping regulations: None.*

Antimony Sulfide (Sulfuret of antimony; Black antimony; Antimony needles; Vitreous antimony; Antimony trisulfide) Sb_2S_3.
Color and properties: (a) Black crystals; (b) Orange-red crystals.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 4.562; m.p. 546° C.
Soluble in ammonium sulfide and potassium sulfide.
Derivation: Occurs in nature as black crystalline stibnite (q.v.). As precipitated from solutions of salts of antimony, the trisulfide is an orange-red precipitate, which is filtered, dried and ground.
Grades: Technical.
Containers: 250, 350, 500 lb. barrels.
Uses: Pigment; antimony salts; pyrotechnics; matches; percussion pellets for cartridges; ruby glass; refining gold from silver and copper; metallic antimony; veterinary surgery.
Railroad shipping regulations: None.*

Antimony, Sulfurated.
A mixture of antimony sulfides and oxides with sulfur.
Color and properties: Orange-red powder.
Derivation: Boiling black antimony with sulfur in alkaline solution followed by precipitation with sulfuric acid.
Uses: Medicine (alterative, diaphoretic, emetic—little used).

Antimony Sulfuret. See Antimony sulfide.

Antimony Thiosulfate. See Antimony cinnabar.

Antimony Tribromide $SbBr_3$
Color and properties: Yellow, deliquescent, crystalline mass.
Constants: Sp.gr. 4.148; m.p. 94.2° C.; b.p. 280° C.
Soluble in carbon bisulfide and hydrobromic acid.
Derivation: By passing bromine vapors over heated antimony oxide.
Method of purification: Sublimation.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Antimony Trichloride. See Antimony chloride.

Antimony Trifluoride. See Antimony fluorides.

Antimony Trioxide. See Antimony oxides.

Antimony Trioxide, Octahedral. See Senarmontite.

Antimony Trioxide, Orthorhombic. See Valentinite.

Antimony Trisulfate. See Antimony sulfate.

Antimony Trisulfide. See Antimony sulfide. For the natural product, see Stibnite.

Antimony Vermilion. See Antimony red.

Antimony White. A durable paint pigment which may be used as a substitute for flake white. It is antimony trioxide. See Antimony oxides.

Antimony Yellow. See Lead antimonate.

Antinosin (Sodium tetraiodophenolphthalein) $(C_6H_2I_2ONa)_2COC_6H_4O$.
Color and properties: Blue powder.
Soluble in water.
Uses: Medicine (surgical antiseptic, unofficial).

Antiphlogistine. See Kaolin cataplasm.

Antipyonin. Neutral sodium tetraborate, used medicinally.

Antipyrine (Phenazone; Phenyldimethylisopyrazolene; Analgesine; Anodynine; Methozin; Metozin; Parodyne; Phenylone; Phenylene; Pyrazine; Pyrazoline; Sedatine) $C_{11}H_{12}N_2O$.
Color and properties: Fine, white, crystalline powder.
Constants: Sp.gr. 1.19; m.p. 113° C.; b.p. 319° C.
Soluble in water, alcohol and chloroform.
Derivation: By the condensation of methylphenylhydrazine and ethyl acetoacetate.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: ¼, 1, 5, 25, 50 lb. tins; 112 lb. cases.
Uses: Medicine (for relief of pain).
Railroad shipping regulations: None.*

Antipyrine Acetyl Salicylate (Acetopyrine; Pyrosal; Acopyrin).
Color and properties: White crystalline powder, acetous odor.
Constants: M.p. 63° to 65° C.
Soluble in alcohol and warm water; sparingly soluble in cold water.
Derivation: Combination of antipyrine (50%), salicylic acid (36%) and acetic acid (14%).
Uses: Medicine (antipyretic; antirheumatic; analgesic in migraine, neuritis; venereal diseases, unofficial).
Railroad shipping regulations: None.*

Antipyrine Mandelate. See Tussol.

Antipyrine Salicylate (Salipyrine; Salazolon) $C_{11}H_{12}N_2OC_7H_6O_3$.
Color and properties: White, coarse, crystalline powder, odorless, tasteless, sometimes causes vomiting.
Constants: M.p. 91.5° C.
Soluble in alcohol and benzene.
Derivation: By the action of salicylic acid upon antipyrine, either at 100° C. or in solution.
Uses: Medicine (antipyretic, antirheumatic, influenza, migraine, coryza, antihemorrhagic in metorrhagia not due to severe organic disease, dysmenorrhea, unofficial).
Railroad shipping regulations: None.*

Antodyne (Phenoxydihydroxypropane; Glycerylphenyl ether) $C_6H_5OCH_2CHOHCH_2OH$.
Color and properties: White crystals.
Constants: M.p. 69° to 70° C.
Soluble in water and alcohol.
Uses: Medicine (analgesic in neuralgia, gonorrhea, arthritis, unofficial).
Railroad shipping regulations: None.*

Antox. A trade name for butyraldehyde-aniline derivative, used as a rubber antioxidant and age resister. It is a nonvolatile amber liquid with sp.gr. 1.01. Used in truck tubes, steam hose, and all products that may be exposed to high temperatures. Also in footwear because of slight discoloration.

Antwerp Blue. See Iron blues.

Apache Coal Powders. United States permissible explosives classified by the United States Bureau of Mines as follows (See Explosives, permissible for explanation of classification):

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
A	B	Ia
B	B	Ia
D, L. F.	A	Ia
E, L. F.	A	Ia
F, L. F.	A	Ia
S	B	Ia

Railroad shipping regulations: High explosive.

Apallagin. Mercury tetraiodophenolphthalein used in medicine as a powerful antiseptic. Unofficial.

Apatite (Asparagus stone). A natural calcium phosphate usually containing fluorine and corresponding to the formula $(CaF)Ca_4(Po_4)_3$. This formula is fluorapatite. Replacements of the F by Cl, OH or CO_3 are also known, the mineral then being termed chlorapatite, hydroxyapatite or carbapatite. There are also compounds containing both fluorine and chlorine. Manganapatite contains up to 10.5% MnO. Fluorapatite (42.3% P_2O_5) and chlorapatite (41.0% P_2O_5) are the only ones of any importance.
Occurrence: United States (Maine, New Hampshire, Massachusetts, Connecticut, New York, Pennsylvania, North Carolina, California), Germany Austria, Switzerland, Italy, Bohemia, Sweden, England, Norway, Spain, Canada.
Uses: Prior to the discovery of the phosphate rock beds of the southern states large quantities

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

were mined in Canada and converted into phosphatic fertilizers. It is still mined in Norway. It is now used to some extent as a source of phosphorus by an electrolytic process.

Apiole (Parsley camphor) $C_{12}H_{14}O_4$.
Dimethoxymethylene ether of allyltetrabenzene.
Color and properties: White, crystalline solid with faint parsley odor.
Soluble in alcohol, ether and fixed oils.
Derivation: Separation from the volatile oil of parsley.
Uses: Medicine (uterine disorders).
Railroad shipping regulations: None.*

Apoatropine Hydrochloride $C_{17}H_{21}NO_2.HCl$.
Color and properties: White crystalline, poisonous alkaloid!
Constants. M.p. 60° to 62° C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: Obtained from atropine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Cans; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Apoatropine Hydrochloride $C_{17}H_{21}NO_2.HCl$.
Color and properties: Colorless crystals; poisonous!
Constants: M.p. 237° to 239° C.
Soluble in water.
Derivation: By the action of hydrochloric acid on apoatropine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Apocodeine $C_{18}H_{19}NO_2$.
Color and properties: White crystalline, poisonous alkaloid!
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: Obtained from codeine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Apocynum (Canadian hemp; American Indian hemp; Black Indian hemp; Dogbane).
Derivation: Dried rhizome of Apocynum cannabinum.
Habitat: United States.
Grades: Technical; U.S.P.
Containers: Sacks.
Uses: Medicine (action on the circulatory system).
Railroad shipping regulations: None.*

Apolysin (Aconitylphenetidine; Phenetidine citrate) $C_6H_7O_6NHC_6H_4OC_2H_5$.
Color and properties: Crystalline, yellowish-white powder, peculiar taste and odor.
Constants: M.p. 72° C.
Soluble in cold water, alcohol, glycerol and concentrated sulfuric acid.
Derivation: By heating citric acid and phenetidine with one molecure of water.
Uses: Medicine (antipyretic, antineuralgic, unofficial).
Railroad shipping regulations: None.*

Apomorphinae Hydrochloridum, U.S.P. See Apomorphine hydrochloride.

Apomorphine $C_{17}H_{17}NO_2$.
Color and properties: White crystalline alkaloid; poisonous!
Soluble in alcohol and ether; slightly soluble in water.
Derivation: From morphine by extraction of one molecule of water.
Method of purification: Crystallization.
Grades: U.S.P.
Containers: 15 grain vials; ⅛, 1 oz. bottles; 5 oz. tins.
Uses: Medicine (in form of the soluble hydrochloride as an emetic).
Railroad shipping regulations: None.*

Apomorphine Hydrochloride
$C_{17}H_{17}NO_2.HCl.\frac{1}{2}H_2O$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 200° to 210° C.
Soluble in water and alcohol.
Derivation: Obtained by the action of hydrochloric acid on apomorphine.
Method of purification: Crystallization.
Grades: U.S.P. (crystals).
Containers: 15 grain vials; ⅛, 1 oz. bottles; 5 oz. tins.
Uses: Medicine (emetic).
Railroad shipping regulations: None.*

Aponal. See Amylene carbamate.

Apophyllite. See Zeolites.

Apopino Oil. See Shiu oil.

Apothesine (Diethylaminopropylcinnamate hydrochloride, gamma-)
$(C_2H_5)_2NCH_2CH_2CH_2COOCHCHC_6H_5.HCl$.
Color and properties: Small, white crystals, almost odorless; faintly bitter taste. Less efficient than cocaine but less toxic. Approximately twice as toxic as procaine.
Constants: M.p. 136° C.
Soluble in water and alcohol; slightly soluble in acetone and ether.
Uses: Medicine (local anesthetic of the procaine type, spinal anesthesia, oral, vomiting, gastric ulcer, unofficial).
Railroad shipping regulations: None.*

Apple Acid. See Malic acid.

Apple Essence. See Amyl valeriate.

Apple Oil. See Amyl valeriate.

Apple, Peru. See Stramonium.

Apricot Essence. A mixture of isoamyl butyrate and isoamyl alcohol.
Railroad shipping regulations: None.*

Apricot Kernel Oil.
Color and properties: Pale, yellow-colored oil; slight almond odor.
Constants: Sp.gr. 0.915 to 0.921 at 15° C.; solidifying point —14° to —20° C.; saponification value 193.1 to 215.1; iodine value 100 to 108.7.
Derivation: By expression from the kernels of Prunus armeniaca.
Railroad shipping regulations: None.*

Aqua. Water.

Aqua Ammonia Fortior U.S.P. Stronger ammonia water—27 to 29% (NH_3) by weight.

Aqua Ammonia U.S.P. An aqueous solution of ammonia (NH_3) containing not less than 9.5% nor more than 10.5% of NH_3 by weight. See also Ammonium hydroxide.

Aqua Anethi, Anisi, Carui, Dill, Cinnamoni, Menthae, etc. Saturated solution of corresponding oil in water.

Aqua Camphorae (Camphor water). Saturated solution of camphor in water.

Aqua-Dag. A proprietary brand of a colloidal suspension said to be pure deflocculated graphite in water. Used as lubricant.

Aqua Destillata, U.S.P. Distilled water.

Aqua Fortis. See Nitric acid.

Aqua Regia (Nitrohydrochloric acid; Nitromuriatic acid; Chloronitrous acid; Chloroazotic acid).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: A mixture of nitric and hydrochloric acids, usually 18 parts of nitric acid and 82 parts of hydrochloric acid.
Color and properties: Fuming yellow, corrosive, suffocating, volatile liquid.
Grades: Technical; N.F.
Containers: Glass bottles.
Uses: Metallurgy; testing metals; dissolving metals (platinum, etc.)
Fire hazard: Dangerous.*
Railroad shipping regulations: White label.

Aquamarine. See Beryl.

Arabic Gum.
A commercial term for acacia gum. There is a series of gums derived from varieties of acacia of which the following are the better known:
White Senaar (Picked turkey, Sudan, Kordofan). White tears with many fissures. Derivation: Acacia, senegal. From Sudan, Kordofan, Africa.
Suakin (Talca; Talha). Varied colors, very brittle. Derivation: Acacia seyal found in Africa (Blue Nile district).
Senegal. Similar to white Senaar but darker in color and with unbroken surface. Derivation: Acacia Senegal. Senegal, Africa.
Morocco (Mogador; Brown Barbary). Dark brown tears or vermiform pieces, many superficial fissures. Derivation: Acacia arabica, Acacia gummiferra. Morocco, Africa.
Cape. Amber-brown color. Derivation: Acacia horrida. Cape Colony, Africa.
Aden (East Indian). Pale amber or pinkish tears. The highest grades approach those of the Kordofan gums in appearance and properties but they are usually darker in color. Derivation: Acacia abyssinicia and Acacia glaucophylla. Abyssinia and Somaliland, Africa.
Wattle (Australian). Deep yellow to deep reddish-brown tears or lumps. Derivation: Several species of acacia known locally as wattles. Australia.
Grades: Technical, U.S.P.
Containers: Wooden kegs; bags.
Uses: Pharmacy; adhesives; inks; textile printing, confectionery.
Railroad shipping regulations: None.*

Arabinose (Pectinose) $OHCH_2(CHOH)_3CHO$.
Color and properties: White crystals.
Constants: M.p. 158.5° to 159.5° C.
Soluble in water; insoluble in alcohol.
Derivation: (a) From calcium dextrogluconate and hydrogen peroxide.
(b) By boiling vegetable gum with dilute sulfuric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Arachic Acid (Arachidic acid) $C_{19}H_{39}COOH$.
Color and properties: Shining, white, crystalline leaflets.
Constants: M.p. 77° C.
Soluble in ether; slightly soluble in alcohol; insoluble in water.
Derivation: From peanut oil.
Grades: Technical; pure.
Containers: Glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Arachidic Acid. See Arachic acid.

Arachin. Protein from peanut, a globulin containing following amino acids in representable amounts, arginine, histidine, lysine, cystine.
Derivation: From peanut meal by means of sodium chloride solution and sodium sulfate method of D. B. Jones and C. O. Johns. By treatment with hydrochloric acid the amino acids are derived from the protein.
Impurities: Trace of albumin.
Uses: Food value.

Arachis Oil. See Peanut.

Aragonite $CaCO_3$. A natural carbonate of calcium corresponding to the same formula as calcite (q.v.) but differing in stability, specific gravity and hardness. Varieties: Flos-ferri, pisolite, tarnowitzite (contains 5% lead carbonate).

Aralia (American spikenard).
Dried rhizome and roots of perennial herb, Aralia racemosa.
Habitat: Eastern North America.
Grades: N.F.
Uses: Medicine (pectoral complaints); questionable value.

Araroba. See Chrysarobin.

Arazym. Trade name for a depilatory enzyme used in the tanning industry.

Arbor Vitae. See Thuja.

Arbutin $C_{12}H_{16}O_7H_2O$.
Color and properties: Long colorless silky needles with bitter taste.
Soluble in water, alcohol and ether.
Derivation: A glucoside found in the leaves of the bear-berry and in the roots, trunks and leaves of most pear species.
Pure arbutin has also been prepared synthetically from acetobromoglucose and quinol in presence of alkali.
Uses: Medicine (antiseptic and diuretic), unofficial.

Archangelica. See Xanthoxylum.

Archil. See Orchil.

Areca Nut (Betel nut, Pinang).
Fruit of Areca catechu. The seeds are hard and heavy, round-conical, depressed at the base, externally brown, mottled with fawn spots. The fresh seeds have a faint cheese-like odor.
Habitat: East Indies.
Grades: Technical.
Containers: Bags.
Uses: Medicine (astringent, cathartic, vermifuge); chewed by the natives (mixed with lime) for its stimulating effect.
Railroad shipping regulations: None.*

Arecoline Hydrobromide $C_8H_{13}NO_2.HBr$.
Color and properties: White crystals.
Contants: M.p. 167° to 168° C.
Soluble in water and alcohol.
Derivation: By the action of hydrobromic acid on arecoline, an alkaloidal principle of the areca nut.
Method of purification: Crystallization.
Grades: Technical.
Containers: 5, 10, 15 grain vials; ⅛, 1 oz. vials.
Uses: Medicine (salivary stimulant and laxative); veterinary (horse colic).
Railroad shipping regulations: None.*

Arenolite. An artificial siliceous-argillaceous-calcareous stone.

Argaldin. A compound of silver albumin and hexamethylenamine representing 8.9% silver.
Uses: Medicine (antiseptic for local infections).

Argatoxyl (Silver atoxylate; Silver para-aminophenylarsonate) $NH_2C_6H_4AsOAgOOH$.
Color and properties: Contains 23% arsenic, 33% silver.
Insoluble in water.
Uses: Medicine (to increase resistance of the body in infectious diseases, puerperal septicemia, rheumatic fever, gonorrheal arthritis, scarlet fever, carbuncles), unofficial.

Argentiferous Copper-glance. See Stromeyerite.

Argentite (Silver glance) Ag_2S.
Lead-gray to black or blackish-gray mineral, streak same color, metallic luster. A natural silver sulfide. Found both primary and as a product of secondary enrichment. Contains 87.1% silver.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Differs from other soft black minerals in cutting like wax. Soluble in nitric acid.
Constants: Sp.gr. 7.2 to 7.36; hardness 2 to 2.5.
Occurrence: United States (Nevada, Colorado), Mexico, Chile, Germany.
Uses: An important ore of silver.

Argento-cuprous Sulfide. See Stromeyerite.

Argentol (Silver quinaseptolate) $C_9H_5NOHSO_3Ag$.
Color and properties: Yellow powder; decomposed into metallic silver and oxyquinoline by septic matters and intestinal juices.
Sparingly soluble in water.
Uses: Medicine (antiseptic, chancres, gonorrhea, surgical infections, unofficial).
Railroad shipping regulations: None.*

Argentum. The Latin name for silver, hence the symbol Ag in chemical nomenclature.

Argentum Credé. See Collargol.

Argilla. See Kaolin.

Argillaceous Hematite. See Hematite, red.

Argillaceous Limestone. See Limestone.

Argoferment. Colloidal silver suspension produced electrolytically. Used in medicine as an antibacterial. Unofficial. See also Silver, colloidal.

Argols. A by-product of the wine industry containing crude potassium acid tartrate (cream of tartar). It consists of a crystalline crust found on the sides of wine vats in which the grape juice has fermented. White argol is the deposit of the white grape and red argol is the deposit of the red grape. Argols are similar to wine lees (q.v.) in their chemical nature, but are purer since they contain less sediment. They contain from about 50 to 85% of potassium acid tartrate and 6 to 12% calcium tartrate.
Containers: 1, 5 lb. cans.
Uses: Manufacture of tartaric acid and tartrates; fertilizer ingredient; manufacture of malt vinegar; mordant in dyeing.
Railroad shipping regulations: None.*

Argon A.
Color and properties: Colorless, inert gas, does not combine chemically with any element, liquefies at —185.84° C.
Slightly soluble in water.
Derivation: (1) By fractional distillation of liquid air.
(2) By the treatment of atmospheric nitrogen with certain metals such as magnesium and calcium to form nitrides.
Grades: Technical; highest purity.
Containers: Steel cylinders (technical); hermetically sealed glass flasks (highest purity).
Uses: Filling electric incandescent lamps; luminescent tubes; substitute for hydrogen in gas thermometers; in the laboratory whenever an inert gas is needed.
Railroad shipping regulations: Green gas label.

Argonin (Silver caseinate).
Color and properties: White powder; contains 4.28% silver; incompatible with acid and acid salts; affected by light.
Soluble in water.
Derivation: Mixing solutions of silver nitrate and sodium caseinate and precipitating with alcohol.
Uses: Medicine (astringent, antiseptic, inflammations of the mucous membrane, gonorrhea, unofficial).
Railroad shipping regulations: None.*

Argulan (Dimethylphenylpyrazolone mercury sulfaminate).
Color and properties: White, crystalline powder. Contains 46.8% mercury.
Insoluble in water.
Uses: Medicine (intramuscular injection in syphilis, unofficial); suspension in olive oil.
Railroad shipping regulations: None.*

Argyn.
Color and properties: A colloidal form of silver oxide with serum albumin occurring as lustrous, black, hygroscopic, granules containing 25 to 30% silver in a not readily ionizable form. It forms colloidal solutions with water and glycerol but not with alcohol.
Grades: N.N.R.
Uses: Medicine (anti-bacterial, unofficial).
Railroad shipping regulations: None.*
See also: Silver, colloidal.

Argyrodite. A mineral containing sulfides of silver and germanium.

Argyrol (Silver vitellin).
Color and properties: Brownish-black scales, hygroscopic. Contains 20 to 25% silver. Solutions lose germicidal properties and become irritant when kept.
Soluble in water and glycerol; insoluble in alcohol.
Derivation: By electrolyzing serum albumin and combining the protein produced with silver.
Grades: N.N.R.
Uses: Medicine (inflammation of mucous membrane, conjunctivitis, urethritis, rhinitis, gonorrheal ophthalmia, unofficial).
Railroad shipping regulations: None.*
See also Silver, colloidal.

Aristochin (Diquinine carbonic ester) $CO(OC_{20}H_{23}ON_2)_2$.
Color and properties: White or pinkish, amorphous powder containing 96% quinine; tasteless; decomposed by acids and alkalis with liberation of quinine.
Soluble in alcohol, ether, chloroform, glycerol and dilute acids; insoluble in water.
Uses: Medicine (antiperiodic, whooping cough, unofficial).
Railroad shipping regulations: None.*

Aristol. See Thymol iodide.

Armco Ingot Iron. A proprietary name for a very pure iron containing, in addition to iron, 0.025% sulfur, 0.017% manganese, 0.012% carbon, and 0.005% phosphorus. It is resistant at room temperatures to very dilute (0.5%) and concentrated (95%) sulfuric acid, dilute and concentrated sodium hydroxide, both hot and cold, and mine and sea waters.

Armoracia Radix (Horse-radish root).
Habitat: Cultivated everywhere.
Derivation: The fresh root of Cochlearia armoracia, containing volatile oil similar to oil of mustard.
Grades: Technical.
Containers: Bags.
Uses: Condiment.
Railroad shipping regulations: None.*

Armoured Concrete. See Concrete.

Armstrong's Acid. See Naphthalene-1:5-disulfonic acid.

Arnatto. See Annatto.

Arnaudon's Green. See Chromic phosphate.

Arnica Flowers (Leopard's bane; Wolfsbane; Mountain tobacco).
Derivation: Dried flowers and heads of Arnica montana. Leaves and root are also used.
Habitat: Northern Europe, Asia and North America.
Grades: Technical; U.S.P.
Containers: Sacks.
Uses: Medicine (irritant).
Railroad shipping regulations: None.*

Arnica Flowers Oil.
Color and properties: Reddish-yellow to brown-colored essential oil; strong aromatic odor and taste. The consistency of the oil varies; sometimes it is a butter-like mass which melts between 20° and 30° C. to a brownish liquid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 0.8905 to 0.9029; acid value 62.6 to 127.3; ester value 22.7 to 32.2.
Solubility in alcohol: With great difficulty. Solutions in absolute alcohol are clear at first, later become turbid.
Derivation: By distillation of the flowers of Arnica montana, L.
Uses: Medicine (liniments, etc.).
Railroad shipping regulations: None.*

Arnica Root Oil.
Color and properties: Light yellow-colored essential oil, darkens with age; pungent aromatic taste; radish odor.
Constants: Sp.gr. 0.982 to 1.00 at 15° C.; optical rotation +0° 25′ to −2°; refractive index 1.507 to 1.508; acid value 4 to 10; ester value 60 to 100.
Solubility in alcohol: In 7 to 12 vols. of 80% alcohol; in 0.5 to 6 vols. of 90% alcohol; occasionally with turbidity.
Derivation: From the dried root of Arnica montana, L.
Uses: Medicine (liniments, etc.).
Railroad shipping regulations: None.*

Aromatic Spirits of Ammonia (Spirit of hartshorn).
Color and properties: Colorless, inflammable liquid; suffocating odor of ammonia; contains 10% of ammonia gas (by weight). Keep well stoppered.
Constants: Sp.gr. 0.810.
Soluble in water and alcohol.
Derivation: By absorbing ammonia in alcohol.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine; pharmacy.
Railroad shipping regulations: Red label.

Arrhenal. See Di-sodium methyl arsenate.

Arrowroot. A starch obtained from the roots of several varieties of plants belonging to the genus Maranta.
Grades: Bermuda; St. Vincent; domestic.
Containers: Bags; barrels.
Uses: Food; sizing; laundry; adhesives; face powder; starches; baking and confectionery industries.
Railroad shipping regulations: None.*

Arrow Wood. See Euonymus. This name is also applied to frangula (q.v.).

Arsacetin (Sodium acetylarsanilate; Sodium para-acetylaminophenylarsonate; Acetyl atoxyl). $CH_3CONHC_6H_4(AsO)OHONa$.
Color and properties: White, crystalline powder, odorless, tasteless; free of arsenous or arsenic acid; solutions will admit of thorough sterilization. Poisonous, may produce optic atrophy.
Soluble in cold, but more so in warm water.
Uses: Medicine (syphilis, trypanosomiasis, unofficial).
Railroad shipping regulations: None.*

Arsaminol. See Arsphenamine.

Arsanilic Acid (Atoxylic acid; Aminophenylarsinic acid, para-; Arsenic acid anilide) $C_6H_4NH_2 . AsO(OH)_2$.
Color and properties: White, crystalline powder; poisonous!
Constants: M.p. 232° C.
Soluble in ether, amyl alcohol and alkaline carbonate solutions; slightly soluble soluble in alcohol and acetic acid; insoluble in aceton, benzene and chloroform.
Derivation: By condensing aniline with arsenic acid, removing the excess of aniline by steam distillation in alkaline solution and setting the acid free by hydrochloric acid.
Method of purification: Conversion into the sodium salt, boiling with animal charcoal, crystallizing the sodium salt and setting the acid free by dilute hydrochloric acid.
Grades: Technical; pure.
Containers: Tins; glass bottles.
Uses: Arsanilates; starting-point for the manufacture of arsenical, medicinal compounds, such as salvarsan, arsphenamine, etc.; starting-point in manufacture of various azo dyes.
Railroad shipping regulations: None.*

Arsenic As_4.
Color and properties: Silvery brittle crystalline metal turning black in air. Sometimes found native. (See also Arsenopyrite, Mimetite, Nicolite, Orpiment, Realgar, Scorodite, Smaltite, Sperrylite.)
Constants: Sp.gr. 5.62 to 5.96; hardness 3.5.
Insoluble in water; soluble in nitric acid.
Derivation: Arsenic ores are roasted and the product recovered by sublimation or distillation. The arsenic oxide thus obtained is reduced.
Grades: Technical.
Containers: Barrels.
Uses: Medicine (mercury amalgam); arsenic salts; metallurgy; glass.
Railroad shipping regulations: None.*

"Arsenic." See Arsenic trioxide.

Arsenic Acid (True arsenic acid; Ortho-arsenic acid) $H_3AsO_4 . \frac{1}{2}H_2O$.
Color and properties: White, translucent crystals; poisonous!
Constants: Sp.gr. 2 to 2.5; m.p. 35.5° C.; b.p. H_2O, 160° C.
Soluble in water; slightly soluble in alcohol.
Derivation: By digestion of arsenic with 12 parts nitric acid and 1 part hydrochloric acid.
Grades: Pure; technical; C.P. (anhydride).
Containers: Glass bottles.
Uses: Manufacture of arsenates; rarely medicinally; glass making.
Railroad shipping regulations: Class B poison.
See also Arsenic pentoxide.

Arsenic Acid Anilide. See Arsanilic acid.

Arsenic Acid, Ortho-. See Arsenic acid.

Arsenic Acid, True. See Arsenic acid.

Arsenic Bisulfide (Red orpiment; Ruby arsenic; Realgar; Red arsenic glass; Red arsenic sulfide; Red arsenic) As_2S_2.
Color and properties: Orange-red powder; poisonous!
Constants: Sp.gr. 3.4 to 3.6; m.p. 307° C.
Soluble in acids and alkalis; insoluble in water.
Derivation: By roasting mispickel and iron pyrites and sublimation.
Grades: Technical.
Containers: Iron canisters.
Uses: Leather industry, depilatory agent; paint pigment; shot manufacture; pyrotechnics; calico dyeing and printing.
Railroad shipping regulations: None.*

Arsenic, Black. A form of arsenic obtained by the sublimation of arsenic in a tube of hydrogen.

Arsenic Bromide (Arsenic tribromide; Arsenious bromide; Arsenous bromide) $AsBr_3$.
Color and properties: Yellowish-white crystals; poisonous!
Constants: Sp.gr. 3.66; m.p. 31° C.; b.p. 221° C.
Soluble in water.
Derivation: By the direct union of arsenic and bromine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry; medicine (ingredient of Clemens' solution).
Railroad shipping regulations: Class B poison.

Arsenic, Butter of. See Arsenic chloride.

Arsenic, Caustic Oil of. See Arsenic chloride.

Arsenic Chloride (Arsenic trichloride; Butter of arsenic; Caustic oil of arsenic) $AsCl_3$.
Color and properties: Colorless, oily liquid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 2.205 (0°/4°); b.p. 130.2° C.

Derivation: (a) By action of chlorine on arsenic. (b) By distillation of arsenic with mercuric chloride. (c) By distillation of arsenious oxide with strong hydrochloric acid. (d) By heating dry arsenious oxide with sulfur chloride at 100° to 125° C.

Uses: Manufacture of carbon tetrachloride from carbon bisulfide (catalyst), pharmaceuticals (arsenated albumins, drug), ceramics (luster finishes).

Railroad shipping regulations: Class B poison.

Arsenic Glass, Red. See Arsenic bisulfide.

Arsenic Hydride. See Arsine.

Arsenic Iodide (Arsenous iodide; Arsenious iodide; Arsenic triïodide) AsI_3.

Color and properties: Orange-red shining crystalline scales or powder; poisonous; unstable in sunlight.

Constants: Sp.gr. 4.39; m.p. 140.7° C.; b.p. 394° C.

Soluble in water, alcohol, ether and carbon bisulfide.

Derivation: By the direct union of arsenic and iodine.

Method of purification: Recrystallization.

Grades: Technical; U.S.P.

Containers: Glass bottles.

Uses: Analytical chemistry; medicine (irritant).

Railroad shipping regulations: Class B poison.

Arsenic Oxide. See Arsenic trioxide.

Arsenic Pentasulfide As_2S_5.

Color and properties: Yellow or orange powder. Soluble in nitric acid and alkalis; insoluble in water.

Derivation: By the decomposition of sulfoarsenates or by precipitating arsenic acid in a hydrochloric acid solution with hydrogen sulfide. It is filtered, then dried.

Grades: Technical.

Containers: Barrels; boxes.

Uses: Paint pigments; blue fire; Bengal lights.

Railroad shipping regulations: None.*

Arsenic Pentoxide (Arsenic oxide; Arsenic acid) As_2O_5.

Color and properties: White, amorphous solid; deliquescent.

Constants: Sp.gr. 4.086; m.p. at red heat; b.p.: Decomposes.

Soluble in water and alcohol.

Derivation: By action of oxidizing agent such as nitric acid on arsenious oxide.

Grades: Various as to purity.

Containers: 400 lb. drums; cartons; boxes; tins.

Uses: Arsenates; insecticides; dyeing and printing.

Railroad shipping regulations: Class B poison.

Arsenic, Ruby. See Arsenic bisulfide.

Arsenic Sulfide, Red. See Arsenic bisulfide.

Arsenic Sulfide, Yellow. See Orpiment.

Arsenic Tersulfide. See Orpiment.

Arsenic Tribromide. See Arsenic bromide.

Arsenic Trichloride. See Arsenic chloride.

Arsenic Triïodide. See Arsenic iodide.

Arsenic Trioxide (Arsenious acid; White arsenic; Arsenious oxide; "Arsenic"; Arsenous anhydride) As_2O_3.

Color and properties: White amorphous, odorless, tasteless powder; poisonous!

Constants: Sp.gr. 3.865; m.p. 200° C.

Soluble in water, alcohol, acids and alkalis.

Derivation: By roasting arsenical pyrites (mispickel) and recovery of the arsenic trioxide by sublimation.

Method of purification: Sublimation.

Grades: Technical; 99%; offgrade (96 to 99%); U.S.P.; C.P.

Containers: 25 lb. boxes; 110, 220 lb. cases; 50, 100, 220 lb. kegs; 500-550 lb. casks.

Uses: Manufacture of pigments, glass, shot and bullets; insecticides; rat poison; cattle dip; weed killer; hide preservative; medicine (violent irritant); manufacture of other arsenic compounds; ceramic enamels; aniline colors; mixed with soda ash for boiler compound; textile mordant; sterilizing agent in water purification.

Railroad shipping regulations: Class B poison.

Arsenic Trisulfide. See Orpiment.

Arsenic, White. See Arsenic trioxide.

Arsenic Yellow. See Orpiment (Pigment).

Arsenical Nickel. See Niccolite.

Arsenical Pyrites. See Arsenopyrite.

Arsenious Acid. See Arsenic trioxide.

Arsenious Bromide. See Arsenic bromide.

Arsenious Iodide. See Arsenic iodide.

Arsenious Oxide. See Arsenic trioxide.

Arsenious Sulfide. See Orpiment.

Arseniuretted Hydrogen. See Arsine.

Arsenobenzene-Billon. A brand of arsphenamine (q.v.).

Arsenopyrite (Mispickel; Arsenical pyrites) FeAsS.

Silver-white to gray mineral with grayish-black streak and metallic luster. Contains 46.0% arsenic, 34.4% iron, 19.6% sulfur. Found in mineral veins associated with ores of silver, cobalt, tin, zinc. Is sometimes highly auriferous.

Soluble in nitric acid.

Constants: Sp.gr. 6.0 to 6.2; hardness 5.5 to 6.0.

Occurrence: United States (California, Alaska), Canada, Brazil, Australia, Bolivia, England, Germany.

Uses: Ore of gold; white arsenic.

See also Danaite.

Arsenous Anhydride. See Arsenic trioxide.

Arsenous Bromide. See Arsenic bromide.

Arsenous Iodide. See Arsenic iodide.

Arsenous Oxide. See Arsenic trioxide.

Arsenous Sulfide. See Orpiment.

Arsine (Arsenic hydride; Arseniuretted hydrogen) AsH_3.

Color and properties: Colorless gas; extremely poisonous!

Constants: Sp.gr. 2.685.

Soluble in water.

Derivation: By the action of sulfuric acid on metallic zinc mixed with arsenic compounds.

Grades: Technical.

Containers: Steel cylinders.

Uses: Organic synthesis.

Railroad shipping regulations: Poison gas.

Arsphenamine (3-Diamino-4-dihydroxy-1-arsenobenzene hydrochloride; Six-o-six; Kharsivan; Arsenobenzene-Billon; Diarsenol; Salvarsan; Arsaminol; Ehrlich 606) $HClNH_2OHC_6H_3As{:}\,AsC_6H_3OHNH_2HCl.2H_2O$.

Color and properties: Light yellow, hygroscopic, poisonous powder, odorless or slight odor. Contains not less than 30% arsenic. Oxidized by exposure to air, it becomes more toxic and darker.

Soluble in water, alcohol, glycerol and sodium hydroxide solution; slightly soluble in chloroform and ether.

Derivation: By reducing 3-nitro-4-hydroxyphenyl arsenic acid with sodium hydrosulfite.

Grades: U.S.P.

Containers: Ampules; sealed glass tubes.

Uses: Medicine (relapsing fever, Vincent's angina, yaws, yellow fever, malaria, amebic dysentery, trench-diarrhea, experimental septicemia, lung gangrene, syphilis).

Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Arsphenamine Solution—Squibb.

Color and properties: Clear yellow liquid varying in shade from a light lemon or light wine to a greenish-yellow and consisting of an aqueous 0.5% solution of arsphenamine having the correct degree of alkalinity.

Grades: U.S.P.

Containers: Ampules.

Uses: Medicine (the same as arsphenamine, unofficial).

Railroad shipping regulations: None.*

Arsynal. See Disodium methylarsenate.

Arsysodile. See Sodium cacodylate.

Artemisia Absinthium Oil. See Wormwood oil.

Artemisia Maritima. See Worm-seed oil, Levant.

Artificial Cinnabar. See Mercuric sulfide, red.

Artificial Gum. See Dextrin.

Artificial Malachite. See Copper carbonate.

Arum.

A starch similar to sago, from the root of Arum maculatum.

Habitat: Middle and southern Europe.

Containers: Bags; barrels.

Uses: Food.

Railroad shipping regulations: None.*

Asabromin. See Calcium dibromobehenate.

Asafetida.

A soft gum resin obtained by incising the roots of Ferula fetida and other species of Ferula. Native in Thibet and Turkistan. Very obnoxious odor.

Grades: U.S.P.; technical; lump; powdered.

Containers: Tins.

Uses: Medicine (local stimulant to nervous membranes); proprietary remedies; condiment.

Railroad shipping regulations: None.*

Asafetida Oil.

Color and properties: Colorless to yellow or brown essential oil. Disagreeable odor suggestive of onions or garlic.

Constants: Sp.gr. 0.915 to 0.993 at 15.5° C.; optical rotation +10° 58′ to −17° 3′; refractive index 1.4942 to 1.5259; sulfur content 8.9 to 31.4%.

Derivation: By distillation of gum asafetida.

Uses: Medicine; proprietary remedies.

Railroad shipping regulations: None.*

Asaprol. See Calcium beta-naphthol sulfonate.

Asar. See Asarum.

Asarabacca Oil. See Asarum europeum oil.

Asarum (Asar; Canada snake root; Wild ginger).

The dried rhizomes and roots of Asarum canadense or Asarum europeum, a low perennial herb.

Chief constituents: An acrid bitter resin and a volatile oil. (See Asarum oil.)

Grades: N.F.

Uses: Medicine (feeble aromatic); source of oil.

Asarum Canadense Oil (Canada snake root oil; Wild ginger oil; Canadian asarabacca oil).

Color and properties: Yellowish-brown volatile oil; agreeable, strong aromatic odor and taste.

Chief known constituents: Linalool; pinene; borneol; terpineol; geraniol; methyl eugenol.

Constants: (a) From rhizome and rootlets: Sp.gr. 0.9508 to 0.9519 at 15° C.; optical rotation −10° 30′ to −22° 0′; refractive index 1.48537 to 1.48987; acid value 3.7 to 4.7; ester value 74.7 to 115.9; after acetylation 125 to 140.1. (b) From rhizomes alone: Sp.gr. 0.9516 to 0.9520 at 15° C.; optical rotation −2° 50′ to −10° 42′; refractive index 1.48508 to 1.48863; acid value 3.1 to 3.7; ester value 86.1 to 117.6; after acetylation 125.8 to 137.2. (c) From rootlets alone: Sp.gr. 0.9659 at 15° C.; optical rotation 39° 40′; refractive index 1.50280; acid value 2.2; ester value 39.2; after acetylation 110.2.

Solubility in alcohol: (a) In 2.6 vols. and more of 70% alcohol; (b) in 2.3 vols. and more of 70% alcohol; (c) in 0.9 vols. and more of 80% alcohol; not soluble in 10 vols. of 70% alcohol.

Derivation: Distilled from the rhizome and roots of Asarum canadense.

Uses: Perfumery.

Railroad shipping regulations: None.*

Asarum Europeum Oil (Asarabacca oil).

Color and properties: Thick, brownish liquid; sweetish aromatic odor; pepper-like burning taste.

Chief known constituents: Asarone, methyl eugenol.

Constants: Sp.gr. 1.015 to 1.068; optical rotation undetermined.

Soluble in alcohol, ether, chloroform and benzene.

Derivation: Distilled from rhizome and roots of Asarum europeum.

Method of purification: Rectification.

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Perfumery.

Railroad shipping regulations: None.*

Asbestine. Proprietary name for a fibrous variety of talc (q.v.) used in paints.

Asbestine Pulp. See Agalite; also Asbestine.

Asbestos (Amianthus).

Fibrous minerals. All are silicates of varying composition and geologic occurrence. Two distinct types: (1) Chrysotile, the serpentine type, is most common and is usually covered by the word "asbestos" and (2) the amphibole minerals.

Serpentine Asbestos

Chrysotile: Hydrous magnesium silicate ($H_4Mg_3Si_2O_9$) containing from 12½ to 14% of water of crystallization. Has silkiest and strongest fiber and can be spun. Fibers from ⅛ to six inches in length. About 95% of commercial asbestos is chrysotile. Value commercially depends upon fiber length. Uses: Textiles, clothing, gloves, curtains, filter cloth, rope, cord, steam packings, heat and electrical insulating materials, brake lining, pipe coverings, roofing and waterproofing papers, paints, cements, stucco, plaster, etc.

Commercial Grades of Chrysotile

Grade	Length
Crude No. 1	Average 1″ length
Crude No. 2	Average ½″ length

	Screen Test			
	½	¼	⅛	Pan
Long spinning fibers	2	9	4	1
Short spinning fibers	0	8	6	2
Paper stock	0	6	6	4
Shingle stock	0	2	9	5
Cement stock	0	0	6	10
Floats	0	0	0	16

Amphibole Asbestos: Silicates of iron, calcium, and magnesium with little or no water of constitution.

Anthophyllite: Anhydrous iron-magnesium silicate. Fibers of low tensile strength and rather harsh and brittle. Cannot be spun. Is more stable chemically than chrysotile and more resistant to acids and heat. Chief uses are for chemical filters and as a cheap filler for paints. For further information see under heading, Anthophyllite.

Amosite: A variety of anthophyllite containing little or no magnesium. Sometimes contains soda. Very long, harsh brittle fibers of brown or gray color and of very little tensile strength. Quite resistant to heat and is used chiefly in insulation and chemical filters.

Crocidolite (Blue asbestos): A sodium-iron silicate of blue color. Fiber is harsh but a little

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

more flexible than amosite. Fuses quite readily to a glass and does not resist heat as well as amosite. Chief use in filters.

Tremolite: A calcium-magnesium silicate. Fibers sometimes silky, but of little tensile strength. Chief use in filters.

Actinolite: Calcium-magnesium-iron silicate of varying length. Harsh and of little tensile strength. Of little value commercially.

Occurrence: United States (Arizona, California, Georgia, Maryland, North Carolina, Oregon, Virginia, Washington, Wyoming), Quebec, Russia, Italy, China, South Africa.

Asbolane (Asbolite). A natural mixture of oxides of manganese and cobalt comparable with wad.
Occurrence: New Caledonia.

Asbolite. See Asbolane.

Asclepias (Pleurisy root).
Dried root of perennial herb, Asclepias tuberosa.
Habitat: United States.
Grades: N.F.
Uses: Medicine as an emetic and cathartic.

Ascoloys. Ferrous alloys which contain in addition to iron the following percentages of other metals: (a) Ascoloy No. 33 contains 12 to 16% chromium, less than 0.15% nickel, less than 0.05% silicon, less than 0.5% manganese and less than 0.12% carbon. It offers good resistance to hot and cold nitric acid in all concentrations, dilute acetic acid in the cold, all concentrations of hot and cold sodium and ammonium hydroxides, sea water and mine water. (b) Ascoloy No. 44 contains 22 to 25% chromium, 10 to 13% nickel, less than 1% manganese, less than 0.5% silicon and less than 0.2% carbon. It is even more resistant to nitric acid, is resistant to all concentrations of hot and cold acetic acid, sodium and ammonium hydroxides, sea water, moist sulfurous atmospheres and mine water. (c) Ascoloy No. 55 contains 26 to 30% chromium, less than 1% manganese, less than 0.6% nickel, less than 0.6% silicon and less than 0.25% carbon. It is as resistant as (b) to nitric acid, is resistant to acetic acid in all concentrations in the cold, and to all concentrations of hot and cold sodium hydroxide and ammonium hydroxides, and sea water and mine water. (d) Ascoloy No. 66 contains 16 to 19% chromium, less than 0.5% manganese, less than 0.5% nickel and less than 0.12% carbon. It offers resistance to hot and cold concentrated nitric acid, all concentrations of hot and cold sodium and ammonium hydroxides.

Ash, Causticized. See Causticized ash.

Asiphyl. See Mercury atoxylate.

Asparagic Acid. See Asparaginic acid.

Asparagine. See Asparaginic acid.

Asparaginic Acid (Asparagine; Asparagic acid; Aspartic acid; Aminosuccinic acid).
$COOHCH_2CH(NH_2)COOH$.
Color and properties: Colorless crystals; odorless. Soluble in water, alcohol and ether.
Derivation: From asparagine, a principle of althea leaves, by saponification with hydrochloric acid.
Grades: Technical.
Containers: Tins.
Uses: Medicine; organic synthesis.
Railroad shipping regulations: None.*

Asparagus Stone. See Apatite.

Aspartic Acid. See Asparaginic acid.

Asphalt (Asphaltum; Bitumen; Judean pitch; Jews' pitch; Mineral pitch; Petroleum asphalt).
Derivation: A bituminous mixture, solid or semi-solid, found native and resulting from a natural process of metamorphosis. It is sometimes associated with mineral matter, the non-mineral constituents being fusible and largely soluble in carbon bisulfide. Natural asphalt is related in origin to petroleum and is brown or brownish-black in color.
Occurrence: United States (Alabama, Arkansas, California, Indiana, Kentucky, Missouri, Nevada, Oklahoma, Texas, Utah, Wyoming), Trinidad, Venezuela, Cuba, Canada and in many European countries.
Constants:
Bermudez asphalt, crude. Color in mass black; fracture conchoidal; luster bright; sp.gr. at 77° F. 1.005 to 1.075; flowing point 135° to 188° F.; free mineral matter 0.5% to 3.65%.
Bermudez asphalt, refined. Color in mass black; fracture conchoidal; luster very bright; streak black; sp.gr. at 77° F. 1.06 to 1.085; penetration at 77° F. 20 to 30; hardness (Moh's scale) less than 1; fusing point (K & S) 130° to 140° F.; flowing point 170° to 180° F. Solubility in CS_2 92% to 97%; free mineral matter 1.5% to 6.5%.
Trinidad asphalt, crude. Water and gas 29.0%; asphalt soluble in CS_2 39.0%; asphalt absorbed by mineral matter 0.3%; mineral matter 27.2%; water of hydration in mineral matter 4.3%.
Trinidad asphalt, refined. Color in mass black; fracture conchoidal; luster dull; streak black; sp.gr. at 77° F. 1.40 to 1.42; hardness (Moh's scale) 1 to 2; penetration at 77° F. 1.5 to 4.0; fusing point (K & S) 188° F.; flowing point 190° F.; soluble in all proportions CS_2; mineral matter 38.5%.
Containers: 1 gal. friction top pails; 25, 50 lb. cans; 400 lb. seamless drums.
Uses: Paving material, waterproofing agent, asphaltic stone and mastic, chewing gum manufacture, making tanks water tight, dielectrics, waterproof cements, fuel, coating insides of gas conveying pipes, etching of glass, leather tanning, impregnating belting, paints, varnishes, roof cements, insulating and roofing papers, etc.
Railroad shipping regulations: None.*
See also: Asphaltite, Bitumen, Asphaltic pyrobitumen, Rock asphalt.

Asphalt, Blown. See Blown asphalt.

Asphalt, Condensed. See Blown asphalt.

Asphalt, Liquid. See Residual oils.

Asphalt, Oxidized. See Blown asphalt.

Asphalt, Residual.
Residues from the steam or dry distillation of mixed-base petroleum and the steam distillation of asphalt-bearing petroleum. They are solid to semi-solid at room temperature.
See also Pitches, artificial.
Railroad shipping regulations: None.*

Asphalt, Sludge. See Sludge asphalt.

Asphalt, Sulfurized. See Sulfurized asphalts.

Asphaltic Pyrobitumen.
A species of pyrobitumen, sometimes associated with mineral matter, the non-mineral constituents being infusible and largely insoluble in carbon bisulfide. Bitumens of this class include elaterite, wurtzilite, albertite, impsonite and the pyrobituminous shales.
Railroad shipping regulations: None.*

Asphaltite.
A native bituminous mixture of the order of asphalt (q.v.) It is sometimes associated with mineral matter and differs from asphalt in that the non-mineral constituents are difficultly fusible and largely soluble in carbon bisulfide. Bituminous mixtures which come under this classification are gilsonite, glance pitch, grahamite, manjak, Syrian asphalt, Egyptian asphalt.

Asphaltum. See Asphalt.

Asphaltum Oil. See Residual oils.

Aspidium (Male fern; Shield fern).

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Dried rhizome of Dryopteris filixmas.
Habitat: North America, northern Asia, Europe, northern Africa.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (intestinal vermifuge).
Railroad shipping regulations: None.*

Aspidosperma. See Quebracho.

Aspidospermine $C_{22}H_{30}O_2N_2$.
Color and properties: Brownish-yellow crystalline alkaloid.
Constants: M.p. 208° C.; b.p. 220° C. (1 to 2 mm.); sublimes at 180° C. under reduced pressure.
Soluble in fats and fixed oils; sparingly soluble in absolute alcohol, ether. Its sulfate and hydrochloride are soluble in water.
Uses: Medicine (treatment of labored breathing, unofficial).
Railroad shipping regulations: None.*

Aspirin. See Acetylsalicylic acid.

Aspirin, Soluble.
The calcium, lithium or sodium salts of aspirin. They are very soluble and are said to introduce no gastric disturbances.

Aspirochyl. See Mercury atoxylate.

Asthma Weed. See Lobelia.

Astral Oil. See Kerosene.

Atacamite $Cu_2ClH_3O_3$ or $Cu(OH)Cl.Cu(OH)_2$ or $CuCl_2.3Cu(OH)_2$.
Bright, emerald or blackish-green mineral of vitreous to adamantine luster and apple-green streak. Copper content reported variously. (a) Cu 14.9%, cupric oxide 55.8%. (b) Cu 59.45%, Cl 16.64%. Soluble in acids.
Constants: Sp.gr. 3.75 to 3.77; hardness 3 to 3.5.
Occurrence: United States (California), Australia, Chile, Bolivia, England, Italy.
Uses: Ore of copper.

Atophan. See 2-Phenylquinoline-4-carboxylic acid.

Atoxyl. See Sodium arsanilate.

Atoxylic Acid. See Arsanilic acid.

Atropamine. See Apoatropine.

Atropinae Sulfas. See Atropine sulfate.

Atropine (Daturine) $C_{17}H_{23}NO_3$.
Color and properties: Colorless, crystalline alkaloid; poisonous. The following salts are used: Hydrobromate, hydrochlorate, methyl bromide, oleate, sulfate (U.S.P.) and valeriate.
Constants: M.p. 114° to 115° C.
Soluble in alcohol, ether, chloroform and glycerol.
Derivation: By extraction from Datura stramonium.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine (to check secretion, stimulate circulation and respiration, overcome spasm of involuntary muscles, locally for its effect on the eye and externally as a local anodyne.
Railroad shipping regulations: None.*

Atropine Methylbromide $C_{16}H_{20}O_3N(CH_3)_2Br$.
Color and properties: White crystals.
Constants: M.p. 222° to 223° C.
Soluble in water and alcohol.
Uses: Medicine (mydriatic with analgesic properties, headaches, neuralgia, night sweats, gastric ulcer, asthma, unofficial).
Railroad shipping regulations: None.*

Atropine Methylnitrate (Eumydrin) $C_{16}H_{20}O_3N(CH_3)_2NO_3$.
Color and properties: White crystalline powder, odorless.
Soluble in water and alcohol.
Uses: Medicine (similar to atropine methylbromide, q.v., unofficial).
Railroad shipping regulations: None.*

Atropine Sulfate (Atropinae sulfas) $(C_{17}H_{23}O_3N)_2H_2SO_4.H_2O$.
Color and properties: White, odorless, crystalline powder, efflorescent in dry air; very poisonous!
Constants: M.p. not below 188° C.
Soluble in water, alcohol and glycerol; less soluble in chloroform and ether.
Derivation: By interaction of a solution of atropine in ether and of sulfuric acid in strong alcohol.
Grades: U.S.P.
Containers: 1 oz. bottles; 5, 15 grain vials.
Uses: Similar to those of atropine (q.v.).
Railroad shipping regulations: None.*

Aubepine. See Anisic aldehyde.

Auer Metal. See Pyrophoric alloy.

Auerlite. A natural silico-phosphate of thorium. Like zircon in form. North Carolina.

Augite. A complex natural silicate. The formula is usually given as $CaMg(SiO_3)_2$ with $(MgFe)(AlFe)_2SiO_6$.
Color: Dark green to black.
Occurrence: United States, Austria, Italy, Germany, Azores, Cape Verde, Hawaiian Isles.

Auramine. A basic yellow dye used in dyeing wool, silk, leather and paper.

Aurantii. See Orange peel oil.

Aurantine. Trade name for Osage orange extract.

Aureolin. See Indian yellow.

Aurichacite $(Zn,Cu)_5(CO)_2(OH)_6$.
Pale bluish-green and often velvety incrustations on smithsonite (q.v.). Soluble in acids.
Constants: Sp.gr. 3.54 to 3.64; hardness 2.
Occurrence: United States (Utah, Arizona), Mexico, Greece, Hungary.

Aurora Yellow. See Cadmium sulfide.

Austenite.
A solid solution of FeC in gamma iron. Obtained in 1.50% carbon steels when quenched in ice water from 1,050° C. Also occurs in steel containing 12% manganese, and in steel containing 25% nickel, even after slow cooling. Carbon content up to 2%.

Austin Red Diamonds. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
9, L.F.	A	I a
10, L.F.	B	I a
2-A, L.F.	A	I a
6-A, L.F.	A	I a
1-D, L.F.	A	I a
B, L.F.	A	I a
F, L.F.	B	I a
C, L.F.	A	I a

Railroad shipping regulations: High explosive.

Australene. See Pinene.

Australian Fever Tree. See Eucalyptus.

Australian Gum. See Arabic gum.

Australian Kino. See Eucalyptus kino.

Austrian Cinnabar. See Chrome red.

Automobile Cylinder Oils.
Heavy. One satisfactory oil for water-cooled gasoline cars with worn cylinders and for motor cycles and motor boats.
Color and properties: Pale, thick oil running freely at 15°F.
Constants: Gr. 29.2°Bé.; fire test 485°F.; Saybolt viscosity 310.
Light. One satisfactory oil for water-cooled gasoline cars.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Pale, light-bodied oil, running freely at 15°F.
Constants: Gr. 30°Bé.; fire test 475°F.; Saybolt viscosity **210.**

Medium. One satisfactory oil for air or water-cooled gasoline cars.
Color and properties: Pale oil running freely at 15°F.
Constants: Gr. 29.5°Bé.; fire test 480° F.; Saybolt viscosity 265.
See also Lubricants, United States Government Master Specification.

Automobile Transmission Gear Oil. Typical oil:
A cylinder stock of gravity 25°Bé. and viscosity 245.

Autumn Crocus. See Colchicum.

Autunite (Calco uranite; Lime uranite) $Ca(UO_2)_2P_2O_8.8H_2O$ or $CaO.2UO_3.P_2O_5.8H_2O$.
Color and properties: Bright yellow mineral of pearly luster.
Derivation: An alteration product of pitchblend (q.v.). Is often found as a scaly incrustation on the joint-planes of weathered granite or gneiss. Contains 15.5% phosphorus pentoxide, 62.7% uranium trioxide, 6.1% lime, balance water.
Constants: Sp.gr. 3.05 to 3.19; hardness 2 to 2.5.
Occurrence: United States (North Carolina, South Dakota, Connecticut), Germany, Italy, Madagascar, China, Australia, northern Portugal.
Uses: Source of uranium and radium.

Aventurine. A form of native quartz (q.v.) spangled with scales of mica, hematite or other mineral. Used in ornaments.

Axle Grease, Railroad.
Mixtures of tallow, palm oil and sodium carbonate solution or tallow, palm oil, sperm oil and sodium carbonate solution have proved satisfactory for this purpose.
Engine-waste grease, fatty or other lubricating material recovered from cotton-waste or wipe-rags, has also been used as an ingredient of these greases.

Axle Oils, Railroad.
Black lubricating oils, especially summer black oils, are stated to be suitable for this purpose.
Typical specifications: Gr. 29°Bé.; flash point 325°F.; cold test 5° to 15°F.
See also Summer black oils; Lubricants, United States Government Master Specification.

Azobenzene (Azobenzol; Azobenzide; Benzeneazobenzene) $C_6H_5N_2C_6H_5$.
Color and properties: Yellow scales.
Constants: M.p. 68°C.; b.p. 293°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By reducing nitrobenzene with sodium stannite.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Manufacture of benzidine and induline dyes.
Railroad shipping regulations: None.*

Azobenzide. See Azobenzene.

Azobenzol. See Azobenzene.

Azotic Acid. See Nitric acid.

Azoxytoluidine. See Diaminazotoluene.

Azurite (Blue carbonate of copper; Hydrated basic copper carbonate; Chessy copper; Chessylite) $2CuCO_3.Cu(OH)_2$.
Copper mineral, various shades of azure-blue in color, vitreous almost adamantine luster, light blue streak. Found as an alteration product of copper-pyrites and other sulfide ores of copper in the upper oxidized zones of mineral veins. Contains 69.2% CuO, 25.6% CO_2, balance water.
Constants: Sp.gr. 3.77 to 3.83; hardness 3.5 to 4.
Occurrence: United States (Pennsylvania, New Jersey, Wisconsin, Arizona, New Mexico, Utah, California), Siberia, France, Hungary, England, Australia.
Uses: Ore of copper, jewelry.

Azurmalachite. A mineral, which is a mixture of the blue and green copper carbonates. See Azurite and Malachite.
Occurrence: United States (Arizona).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

B

B-L-E. A trade name for an amine reaction product used as a rubber antioxidant and age resister. It is a nonvolatile amber liquid with sp.gr. 1.087. Used as antioxidant for pure gum and compounded stocks except for pure white and goods of delicate colors.

B. S. Oil. Rod wax (q.v.).

Babbitt Metal (White metal). An alloy containing 65 to 90% of tin, with varying proportions of copper and antimony, used for bearings, etc.

Bacterol. A cresol-soap disinfectant. Phenol coefficient, without organic matter 1.58, with organic matter 1.34.

Badische Acid. See 2-Naphthylamine-8-sulfonic acid.

Bagasse (Megass). The crushed cane pulp left after the juice has been expressed from sugar canes. Used in insulating buildings.

Bahama White Wood. See Canella.

Bakelite. Condensation products of formaldehyde and phenol or cresol, used as plastics, insulating materials, and synthetic resins, and in the production of lacquers.

Baker's Sugar. See Dextrose.

Baking Powders. Powdered chemicals used as a substitute for yeast in baking for generating carbon dioxide gas in the dough. There is a number of mixtures. One of the most prominent on the market is a mixture of sodium bicarbonate, cream of tartar, tartaric acid, and starch.

Baking Soda. See Sodium bicarbonate.

Bakuin. A Russian lubricating oil prepared from Baku petroleum.
Uses: Specially recommended for lubricating heavy machinery due to its high viscosity and great resistivity to cold.

Balata. See Chicle gum.

Baldwin's Phosphorus. Fused nitrate of lime, which emits light for some hours after exposure to sunlight.

Ball Clay. See under Clays.

Balloon Gas.
(a) A mixture of oil and water gas having a low specific gravity. Typical analysis: 1 to 4% illuminants, 5 to 15% carbon monoxide, 63 to 75% hydrogen, 10 to 11% methane, 0.0 to 0.8% ethane, 1.0 to 2.6% carbon dioxide, 0.5 to 0.6% oxygen, 5 to 7% nitrogen. Sp.gr. 0.35 to 0.37.
(b) A gas produced by decomposing coal gas by passing it through hot coke. Typical analysis: 7.3% carbon monoxide, 80.7% hydrogen, 6.9% methane, 5.1% nitrogen, illuminants, nil.
See also Hydrogen, Helium.

Balm, Mint. See Crispmint.

Balm of Gilead (Mecca balsam).
Resinous juice of the evergreen tree, Commiphora opobalsamum.
Habitat: Shores of the Red Sea.
Uses: Medicine (rarely used).

Balm Oil (Melissa oil; Lemon-balm oil).
Color and properties: Yellow oil; pleasant balm odor.
Chief known constituents: Citral, citronellol.
Constants: Sp.gr. 0.894 to 0.924; optical rotation, +0° 30′ to −6° 30′.
Derivation: By distillation, from the leaves and tops of Melissa officinalis. Note, however, that the pure oil is very expensive and therefore, the commercial oil is frequently either lemon or citronella oil, or a mixture of the two, distilled over the green herb.
Uses: Perfumery; medicine; flavoring.
Railroad shipping regulations: None.*

Balsam. An aromatic, liquid, resinous substance exuding from a tree or shrub and consisting of a resin mixed with a volatile oil, usually with benzoic or cinnamic acids and their esters. For individual balsams see under their respective names; e.g., Balsam copaiba. See Copaiba.

Balsam Poplar Buds
Dried winter leaf-buds of the balsam poplar, Populus nigra, candicans or balsamifera. Often incorrectly called balm of gilead buds.
Habitat: Europe, Siberia, North America.
Grades: N.F.
Use: Medicine (similar to the turpentines).

Banana Oil. See Amyl acetate.

Banewort. See Belladonna.

Bannal. See Scoparius.

"Banroc." See Mineral wool.

Baptisia (Wild indigo).
Dried root of Baptisia tinctoria, a perennial herb.
Habitat: Eastern United States.
Chief constituents: A dye, a glucoside, an alkaloid.
Grades: N.F.
Uses: Source of blue dye; medicine (treatment of certain septic conditions).

Barbaloin. See Aloin.

Barberite. A non-ferrous alloy containing 88.5% copper, 5% nickel, 5% tin, 1.5% silicon. It offers good resistance to sulfuric acid in all dilutions up to 60%, sea water, moist sulfurous atmospheres and mine waters.

Barbierite. See Feldspar.

Barbital. See Veronal.

Barbital, Sodium. See Veronal, soluble.

Barbital, Soluble. See Veronal, soluble.

Barbitone. See Veronal.

Barbituric Acid $CO(NHCO)_2CH_2.2H_2O$.
Color and properties: White crystals.
Soluble in water, alcohol and ether.
Derivation: By condensing malonic acid ester with urea.
Grades: Technical.
Containers: 1, 5 lb. glass bottles; tins.
Uses: Preparation of pharmaceutical chemicals; plastics (condensation agent with furfurol).
Railroad shipping regulations: None.*

Bardana. See Lappa.

Barilla. An impure carbonate of soda, obtained by drying sea plants and then burning in furnaces, so heated as to imperfectly fuse the ashes.

Barite. See Barytes.

Barium Ba.
Color and properties: Silver-white, slightly lustrous, somewhat malleable metal. All barium

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

salts except the sulfate are poisonous and are the cause of "loco" disease in man and cattle. Occurs in combination in nature in form of barytes (Georgia, Tennessee, Missouri, Germany) and witherite (Germany, England).
Constants: Sp.gr. 3.78; m.p. 850°C.; b.p. 950°C.
Soluble in acids; decomposes water.
Derivation: By electrolysis of molten barium chloride in presence of ammonium chloride.
Grades: Technical (not an article of commerce as yet; small quantities available at a very high price from dealers in rare minerals, etc.).
Containers: Iron drums.
Uses: Alloys; pyrotechnics.
Railroad shipping regulations: None.*

Barium Acetate $Ba(C_2H_3O_2)_2.H_2O$.
Color and properties: White crystals; poisonous!
Constants: Sp.gr. 2.02.
Soluble in water.
Derivation: Acetic acid is added to a solution of barium sulfide. The product is recovered by evaporation and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C. P.
Containers: 1, 5 lb. bottles; 525 lb. casks.
Uses: Chemical reagent; chemicals (acetates, acetone); verdigris; textile mordant.
Railroad shipping regulations: None.*

Barium Binoxide. See Barium peroxide.

Barium Bromate $Ba(BrO_3)_2.H_2O$.
Color and properties: White crystals or crystalline powder.
Constants: Sp.gr. 3.820; m.p.: Decomposes.
Soluble in water; insoluble in alcohol.
Derivation: By passing bromine into a solution of barium hydroxide, barium bromide and barium bromate being formed which are separated by crystallization.
Method of purification: Recrystallization.
Grades: Pure; reagent.
Containers: Glass bottles; 25 lb. tin boxes.
Uses: Analytical reagent.
Fire hazard: Dangerous*
Railroad shipping regulations: Yellow label.

Barium Bromide $BaBr_2.2H_2O$.
Color and properties: Colorless crystals; poisonous!
Constants: Sp.gr. 3.852.
Soluble in water.
Derivation: By the interaction of barium sulfide and hydrobromic acid, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: 50 lb. cases.
Uses: Manufacturing bromides.
Railroad shipping regulations: None.*

Barium Carbonate $BaCO_3$.
Color and properties: White powder; found in nature as the mineral witherite; poisonous!
Constants: Sp.gr. 4.275; m.p. 1,360° C.
Insoluble in water.
Derivation: (1) Interaction of barium sulfide and soda ash solutions. (2) By passing a current of carbon dioxide gas through the solution of barium sulfide.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 200 lb. bags; 300, 700, 800, 1,000 lb. barrels.
Uses: Barium salts; rat poison; optical glass; flat wall paint; foundry core compounds; water purification; ceramics (tile, terra cotta, porcelain); marble substitutes; dyes; enamels for ironware; rubber; beet sugar; chemical reagent.
Railroad shipping regulations: None.*

Barium Chlorate $Ba(ClO_3)_2.H_2O$.
Color and properties: Colorless prisms or white powder; poisonous!
Constants: Sp.gr. 3.179; m.p. 414°C.
Soluble in water.
Derivation: Electrolysis of barium chloride.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; 1 lb. cans; wooden kegs.
Uses: Pyrotechnics; explosives; textile mordant; manufacture of other chlorates.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Barium Chloride $BaCl_2.2H_2O$.
Color and properties: Colorless flat crystals; poisonous!
Constants: Sp.gr. 3.097; m.p. 860°C.
Soluble in water, alcohol.
Derivation: (1) By the action of hydrochloric acid on barium sulfide with subsequent crystallization. (2) By treating witherite (natural barium carbonate) with hydrochloric acid. (3) By roasting crude barite with coal and calcium chloride. (4) By treating a solution of barium sulfide with calcium chloride.
Method of purification: Recrystallization.
Grades: Technical (crystals or powdered); C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 200 lb. bags; 400 lb. barrels; 800, 1,000 lb. casks.
Uses: Chemicals (artificial barium sulfate, other barium salts, photographic chemicals); in ceramics to precipitate soluble sulfates as insoluble sulfate of barium; color lakes; leather tanning and finishing; rat and vermin poisons; pigments; drug; purification of sugar juice; textiles (mordant, weighting, calico-printing); water softener; boiler compounds; chemical reagent.
Railroad shipping regulations: None.*

Barium Chromate $BaCrO_4$.
Color and properties: Heavy, yellow, crystalline powder; poisonous!
Constants: Sp.gr. 4.498.
Soluble in acids; insoluble in water.
Derivation: By the interaction of barium chloride and sodium chromate. The precipitate is washed, filtered and dried.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels; kegs.
Uses: Safety matches; see also Chrome yellows.
Railroad shipping regulations: None.*

Barium Cyanide $Ba(CN)_2$.
Color and properties: White, crystalline powder; poisonous!
Soluble in water and alcohol.
Derivation: By the action of hydrocyanic acid on barium hydroxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Steel barrels.
Uses: Metallurgy.
Railroad shipping regulations: Class B poison.

Barium Dioxide. See Barium peroxide.

Barium Ethylsulfate (Barium sulfovinate) $Ba(C_2H_5SO_4)_2.2H_2O$.
Color and properties: Colorless crystals; poisonous!
Soluble in water and alcohol.
Derivation: By the interaction of barium hydroxide and ethylsulfuric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic preparations.
Railroad shipping regulations: None.*

Barium Fluoride BaF_2.
Color and properties: White powder; poisonous!
Constants: Sp.gr. 4.828; m.p. 1,280°C.
Sparingly soluble in water.
Derivation: By the interaction of barium sulfide and hydrofluoric acid followed by crystallization.
Grades: Technical; C.P.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: 1, 5 lb. bottles; wooden barrels.
Uses: Enamels; antiseptic; embalming fluids.
Railroad shipping regulations: None.*

Barium Hydrate. See Barium hydroxide.

Barium Hydroxide (Barium hydrate; Caustic baryta) $Ba(OH)_2.8H_2O$.
Color and properties: White powder; poisonous; absorbs carbon dioxide from air. Keep well stoppered!
Constants: Sp.gr. 1.656; m.p. 78°C., losing its water of crystallization; b.p. 103°C.
Soluble in water, alcohol and ether.
Derivation: (a) By dissolving barium oxide in water with subsequent crystallization. (b) By precipitation from an aqueous solution of the sulfide by caustic soda. (c) Prepared on a large scale by heating barium sulfide in earthenware retorts into which a current of moist carbonic acid is passed, after which superheated steam is passed over the resulting heated carbonate.
Impurities: Iron and calcium in some commercial grades.
Method of purification: Recrystallization.
Grades: Technical (crystals or anhydrous powder); U.S.P.; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 500, 700 lb. barrels.
Uses: Organic preparations; barium salts; beet sugar industry (now largely replaced by strontium or lime); refining animal and vegetable oils.
Railroad shipping regulations: None.*

Barium Iodide $BaI_2.2H_2O$.
Color and properties: Colorless crystals; decompose and redden on exposure to air; poisonous!
Constants: Sp.gr. 5.150; m.p.: Loses $2H_2O$ at 539°C. and melts at 740°C.
Soluble in water and alcohol.
Derivation: By the action of hydriodic acid on barium hydroxide or of barium carbonate on ferrous iodide solution.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1 oz. vials; ¼, 1, 5 lb. bottles.
Uses: Iodides.
Railroad shipping regulations: None.*

Barium Manganate (Manganese green; Cassel's green; Rosenstiehl's green) $BaMnO_4$.
Color and properties: Emerald-green powder; poisonous!
Constants: Sp.gr. 4.85.
Insoluble in water; decomposed by acids.
Derivation: By heating manganese dioxide with barium nitrate and barium sulfate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Pigment.
Railroad shipping regulations: None.*

Barium Monosulfide. See Barium sulfide.

Barium Monoxide. See Barium oxide.

Barium Nitrate $Ba(NO_3)_2$.
Color and properties: Lustrous, white crystals; poisonous!
Constants: Sp.gr. 3.244; m.p. 575°C.
Soluble in water; insoluble in alcohol.
Derivation: (1) By the action of nitric acid on barium carbonate, oxide or hydroxide and subsequent crystallization. (2) By adding sodium nitrate (Chile saltpeter) either to a solution of barium chloride or barium sulfide.
Method of purification: Recrystallization.
Grades: Technical; crystals; fused mass or powder; C.P.
Containers: 1, 5 lb. bottles; 5, 25, 50 lb. boxes; 100 lb. kegs; 500 lb. barrels; 800-900 lb. casks.
Uses: Pyrotechnics (gives green light); explosives; drug; chemicals (barium peroxide).
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Barium Oxide (Barium monoxide; Barium protoxide; Calcined baryta) BaO.
Color and properties: White to yellowish-white powder; absorbs carbon dioxide readily from air; keep well stoppered; poisonous!
Constants: Sp.gr. 4.73 to 5.46.
Soluble in acids; with water forms the hydroxide.
Derivation: Fusion of barium sulfate mixed with carbon in an electric furnace.
Impurities: Barium carbonate, iron.
Grades: Technical.
Containers: Iron barrels.
Uses: Glass industry; manufacturing barium salts; in Europe for refining of beet sugar.
Railroad shipping regulations: None.*

Barium Peroxide (Barium binoxide; Barium dioxide) BaO_2.
Color and properties: Grayish-white powder; poisonous!
Constants: Sp.gr. 4.96.
Decomposes in water.
Derivation: (1) By heating the monoxide in a stream of oxygen. (2) By converting barium nitrate or barium carbonate into barium oxide by heating in a closed container and then converting to the peroxide by heating at about 700° C. in a current of air free from CO_2 and moisture.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 800 lb. drums; 800, 1,000 lb. barrels.
Uses: Manufacture of oxygen and hydrogen peroxide; bleaching (textiles and straw hat industry); tracer bullets; primer in combination with aluminum powder in aluminic thermic welding; oxygenated water.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Barium Protoxide. See Barium oxide.

Barium Rhodanide. See Barium sulfocyanate.

Barium Sulfate. Barytes (q.v.) is the natural product and blanc fixe (q.v.) is the synthetic product.

Barium Sulfate, Precipitated. See Blanc fixe.

Barium Sulfide (Barium monosulfide) BaS.
Color and properties: Yellowish-green or gray powder or lumps; poisonous!
Constants: Sp.gr. 4.25.
Soluble in water.
Derivation: Barium sulfate (crude barytes) and coal are roasted in a furnace. The melt is lixiviated with hot water, filtered and evaporated.
Impurities: Iron, arsenic.
Grades: Technical.
Containers: 500 lb. casks.
Uses: Depilatory; barium salts including lithopone; vulcanizing; weighting gutta-percha; generating perfectly pure hydrogen sulfide for analytical purposes.
Railroad shipping regulations: None.*

Barium Sulfocyanate (Barium sulfocyanide; Barium rhodanide) $Ba(SCN)_2.2H_2O$.
Color and properties: White crystals; poisonous!
Soluble in water.
Derivation: By heating barium hydroxide with ammonium sulfocyanate and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Iron drums.
Uses: For making aluminum or potassium sulfocyanates.
Railroad shipping regulations: None.*

Barium Sulfocyanide. See Barium sulfocyanate.

Barium Sulfovinate. See Barium ethylsulfate.

Bark Extract.
Usually refers to quercitron bark extract.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Barm. See Yeast.

Barrel Syrup. See Molasses.

Barreswil's Solution. See Fehling's solution.

"Barretan." Trade name for a line of synthetic tanning extracts.

Barutin (Theobromine barium-sodium salicylate).

Color and properties: White amorphous powder, sweet alkaline taste. Contains approximately 25% theobromine, 17% barium.

Soluble in water.

Uses: Medicine (diuretic) unofficial.

Barwood.

Wood of the tree Baphia nitida.

Habitat: West coast of Africa.

Uses: For its red dye.

Baryta, Calcined. See Barium oxide.

Baryta, Caustic. See Barium hydroxide.

Baryta Water. A solution of barium hydroxide.

Baryta Yellow. See Chrome yellows.

Barytes (Heavy spar; Barite; Tiff) $BaSO_4$.

Natural barium sulfate.

Color and properties: White sometimes inclining to shades of yellow, gray, blue, red, brown or dark brown due to presence of iron oxides. White streak, vitreous, pearly or resinous luster.

Chief known constituents: Contains, when pure, 65.7% BaO, 34.3% SO_3. Commercial grades of the crude product contain from 90 to 95% $BaSO_4$.

Constants: Sp.gr. 4.3 to 4.6; hardness 2.5 to 3.5.

Grades and uses:

Tiff. Crude, unground product used for manufacture of barium chemicals, lithopone and ground barytes.

Ground barytes, off color, unbleached. Pigment for dark paints; filler for paper board, wall paper.

Ground barytes, prime white, floated, bleached. Pigment for white paints, filler for paper, rubber goods, artificial ivory, linoleum, oilcloth; X-ray apparatus; storage batteries; flux for smelting brass.

See also Barium sulfate and Blanc fixe.

Occurrence: United States (Connecticut, Colorado, Dakota, New York, Pennsylvania, Virginia, North Carolina, Tennessee, Georgia, Lake Superior region, Missouri, Kansas, New Mexico, Oklahoma), Canada, England, Scotland, Hungary, Austria, Germany, France.

Railroad shipping regulations: None.*

Barytes, Artificial. See Blanc fixe.

Barytes, Synthetic. See Blanc fixe.

Barytocalcite $BaCa(CO_3)_2$.

A yellowish-white carbonate of barium and calcium found in localities containing witherite (q.v.).

Basalt.

A dense to glassy, dark-colored basic, volcanic rock composed essentially of soda-lime feldspar and pyroxene, with or without olivine (q.v.) and with accessory magnetite (q.v.) or ilmenite (q.v.). An average of 198 analyses of typical basalts gave: 49.06% SiO_2, 15.70% Al_2O_3, 5.38% Fe_2O_3, 6.37% FeO, 8.95 % CaO, 6.17% MgO, 3.11% Na_2O, 1.52% K_2O, 1.36% TiO_2, 0.31% MnO, 0.45% P_2O_5, 1.62% H_2O. Interpretations of the term are rather indefinite and quarrymen sometimes include any dark-colored fine-grained rock under the term basalt or trap rock.

Uses: Road metal; paving blocks; building stone.

Basanite. See Lydium stone.

Base Goods, Dry. Usually a mixture of acid phosphate with materials containing ammonia or potash or both. After curing, it is used as a base in making fertilizer mixtures.

Base Goods, Wet. Base goods made by treating phosphate rock and nitrogenous substances with sulfuric acid. Used as a base in making fertilizer mixtures.

Base Oils. See Blown oils.

Basic Cinder. See Basic slag.

Basic Open-Hearth Slag. See Slag.

Basic Phosphate. See Basic slag.

Basic Slag (Basic cinder; Basic phosphate; Thomas metal; Thomas slag; Belgian slag).

A slag produced in the conversion of pig iron of high phosphorus content into steel. It contains a variable amount of tricalcium phosphate, calcium silicate, lime and oxides of iron, magnesium and manganese. Used as a fertilizer, being particularly valuable for grazing lands. See also Slag.

Basil Oils (Sweet basil oil).

Color and properties: Essential oils of which there are two commercial varieties, viz., (a) ordinary sweet basil oil and (b) Réunion oil. Yellow color; odor is aromatic, penetrating, esdragon-like (ordinary); camphor-like (Réunion).

Chief known constituents: (a) Methylchavicol; linalool; cineole. (b) Pinene, cineole, camphor and methylchavicol.

Constants: (a) Sp.gr. 0.904 to 0.930 at 15°C.; optical rotation —6° to —22°; refractive index 1.481 to 1.495; acid value up to 3.5; ester value 1 to 12; (b) Sp.gr. 0.945 to 0.987 at 15° C.; optical rotation +0° 22′ to +12°; refractive index 1.51505 to 1.51753; acid value up to 3; ester value 9 to 22.

Solubility in alcohol: (a) In 1 to 2 vols. and more of 80% alcohol (sometimes opalescent or with separation of paraffin). (b) In 2 to 3 vols. of 80% alcohol; (mostly) in 3 to 7 vols. of 80% alcohol (occasionally with separation of paraffin).

Derivation: From the leaves of several varieties of the sweet basil, Ocimum basilicum, L.

Uses: Flavoring; medicine.

Railroad shipping regulations: None.*

"Basofor." A trade name for Barium sulfate.

Bass Wood. See Linden.

Bassora Gum.

A term applied collectively to a group of high-colored gums which are somewhat similar to tragacanth gum. The bassora gums of commercial importance are Indian gum (q.v.) and kuteera gum (q.v.).

Bassorin (Tragacanthin; Adraganthin).

A slimy non-adhesive mucilaginous residue obtained when tragacanth gum is treated with water several times and filtered. In the presence of alkalis the whole of the gum dissolves.

Bastard Saffron. See Carthamus.

Bastose. The cellulosic substance of jute fiber.

Batching Oil.

A non-viscous neutral oil. The most suitable is stated to have a gravity of 34°Bé. and a viscosity of 80 Saybolt.

Railroad shipping regulations: None.*

Battery Acid (Electrolyte acid).

Sulfuric acid of strengths suitable for use in storage batteries. The product is water-white, odorless and practically free from iron.

Derivation: By diluting high-grade commercial sulfuric acid, free from niter, with distilled water to standard strengths. The 1.835 grade is made by condensation of pure sulfuric anhydride with water in fused-silica apparatus.

Strengths:

Specific Gravity	Sulfuric Acid %	Freezing Point °F.
1.210	28.5	24
1.400	50.07	33
1.835	93.19	29

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Approximate freezing points of electrolyte:

Specific Gravity	Charge of Battery	Freezing Point °F.
1.100	Discharged	+18
1.150	Discharged	+ 5
1.165	Discharged	— 0
1.180	Discharged	— 6
1.200	Half charged	—23
1.225	Half charged	—30
1.250	Half charged	—61
1.280	Full charged	—96

Containers: Carboys.
Uses: Storage batteries.
Railroad shipping regulations: White label.
See also Sulfuric acid.

Baumé's Flux. A flux which will deflagrate with great intensity. It is composed of potassium nitrate (6 parts), sulfur (2 parts) and sawdust (2 parts).

Bauxite.
A natural hydrated alumina to which the formula $Al_2O_3.2H_2O$ is usually given. Its composition is variable and it may grade into diaspore (q.v.) or gibbsite (q.v.) or, as has been suggested, may be a mixture of both. Contains 30.3 to 76.9% Al_2O_3, 8.6 to 31.1% H_2O, 0.1 to 48.8% Fe_2O_3, 1.1 to 41.5% SiO_2, 1.6 to 4.0% TiO_2.
Color: White, red, yellow, brown or black; streak, same; dull or earthy luster.
Constants: Sp.gr. 2.4 to 2.5; hardness 1 to 3.
Occurrence: United States (Arkansas, Alabama, Tennessee, Georgia), France, Austria, Italy, Ireland.
Uses: Most important source of aluminum; abrasives (artificial emery, corundum; emery paper); cement (kiln linings); chemicals (alums, aluminates); paint pigments and fillers; refractories; petroleum (decolorizing); sugar (clarification of molasses).

Bay. See Laurus.

Bay-berry. See Laurus and myrica.

Bay-berry Oil.
Color and properties: Yellowish-brown essential oil; aromatic odor distinct from that of bay oil; phenol content 73%.
Constants: Sp.gr. 1.0170 at 15°C.; optical rotation —7° 3′.
Solubility in alcohol: In 1.5 vol. of 70% alcohol; in 0.5 vol. and more of 80% alcohol.
Derivation: By distillation of the berries of Pimenta acris, Wight.
Railroad shipping regulations: None.*

Bay-berry Wax (Myrtle wax).
Color and properties: Green wax; bitter taste; feeble odor.
Chief constituents: Palmitin, palmitic acid, myristin and lauric acid.
Partly soluble in alcohol.
Derivation: By boiling the berries of myrica (candle-berry, bay-berry, wax myrtle, wax-berry, tallow shrub). The wax on the berries melts and floats.
Grades: Technical.
Containers: Boxes.
Uses: Candles.
Railroad shipping regulations: None.*

Bay-leaf Oil. See Bay oil

Bay Oil (Oil of Myrica; Bay-leaf oil).
Color and properties: Essential oil; yellow color, becoming brown on exposure to the air; pleasant clove-like odor; pungent, spicy taste; phenol content 59 to 66% (poor oils 40%).
Chief known constituents: Eugenol, methyl eugenol, myrcene, phellandrene, citral, chavicol and methylchavicol.
Constants: Sp.gr. 0.965 to 0.985, poor oils 0.951; optical rotation up to —2°, rarely to —3°; refractive index 1.510 to 1.520.
Solubility in alcohol: In 1 to 2 vols. of 70% alcohol (if freshly distilled; solubility decreases rapidly with age).
Derivation: By distillation of the leaves and shoots of Pimenta acris, Wight. Note: Many of the species of the genera Pimenta and Myrcia closely resemble one another. Thus, often, a mixture of the leaves is distilled unless great care is exercised in the gathering.
Adulteration: Turpentine oil.
Railroad shipping regulations: None.*

Bay Oil, Terpeneless.
Concentration: About 2 to 3 times that of the ordinary bay oil.
Constants: Sp.gr. 1.03 to 1.04.
Solubility in alcohol: 35 vols. in 100 vols. of 60% alcohol; 90 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Bay Plum. See Guava.

Bay Rum.
Properly, the distillate from a mixture of 200 pounds of dried bay leaves, 65 gallons rum, 100 gallons water, a little salt. Now commonly substituted is a mixture of oils of myrica orange, pimenta in a 57% alcoholic solution.
Uses: Aromatic; shaving lotions; alcoholic rub.

Bay Salt.
Derivation: Produced by exposure of sea-water to evaporation by the action of the atmosphere or the rays of the sun. Contains sodium chloride (sea salt).
Containers: Bags.

Bayer 205.
Color and properties: White powder. Its composition has not been published but it is thought to be an aminonaphthalene sulfonic acid derivative. It is known to contain neither mercury nor arsenic. Unaffected by sterilization.
Soluble in water.
Grades: Medicinal.
Uses: Medicine (tripanosomiasis, unofficial).
Railroad shipping regulations: None.*

Bayer's Acid. See 2-Naphthylamine-7-sulfonic acid.

Bazaar Glue. See Glue and gelatin.

Bdellium. See Bissabol.

Bean Oil. See Soya-bean oil.

Bean Oil, Chinese. See Soya-bean oil.

Bear's Weed. See Eriodictyon.

Bearberry Bark. See Cascara sagrada bark.

Bearwood. See Cascara sagrada bark.

Bebeerine (Bebirine; Buxine) $C_{18}H_{21}O_3N$.
Color and properties: White to yellowish-brown, amorphous powder alkaloid.
Constants: M.p. 214°C.
Soluble in water and alcohol.
Derivation: By extraction of the bark of Nectandra rodiae or Pareira brava and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine, in form of sulfate and other salts in treatment of fevers and female disorders. The commercial sulfate (Nectandra) is a mixture of at least five alkaloids allied to bebeerine.
Railroad shipping regulations: None.*

Bebeerine Hydrochloride $C_{18}H_{21}NO_3.HCl$.
Color and properties: Reddish-brown scales.
Constants: M.p. 259°C.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on bebeerine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Bebirine. See Bebeerine.

Bee Bread. See Borage.

Beechwood Creosote. See Creosote, beechwood.

Bees-wax.
Constants: Sp.gr. 0.965 to 0.969; m.p. 63° to 64°C.
Soluble in alcohol, ether, acetone and chloroform.
Derivation: From the honey-comb of bees by melting in hot water and drawing off the wax into molds. It is bleached by exposure in thin films to the sun, or by the moderate action of chromic acid, nitric acid, hydrogen peroxide, or ozone generated by electric discharge.
Grades: Crude; refined; U.S.P.
Containers: Various sizes of bags and cases; 100 lb. kegs; 300 lb. barrels.
Uses: Candle making; pharmacy; leather dressing; shoe polishes; cements; chewing gum; adhesives; anatomical specimens; artificial fruit and flowers; wood polishes; transparent paper; cosmetics; pharmaceuticals; process engraving; lithographing; ingredient of sizing and finishing compounds for textiles.
Railroad shipping regulations: None.*

Beet Molasses. See Molasses.

Behn Oil (Ben oil). An oil obtained from the seeds of Moringa aptera.

Belgian Slag. See Basic slag.

Belladonna (Deadly nightshade; Death's herb; Banewort; Divale; Poison black cherry).
An herbaceous perennial bush of which the leaves and roots are used for their content of hyoscyamine and atropine (q.v.).
Habitat: Southern and central Europe, Asia Minor, Algeria; cultivated in North America, England and France.
Grades: Technical; U.S.P.
Containers: Boxes.
Railroad shipping regulations: None.*

Bell Metal. An alloy used for casting bells. It is generally composed of about 80% copper and 20% tin. It often contains small amounts of lead and zinc.

Belmontine Oil. A mineral burning oil. See Burning oils, mineral.

Ben Oil. See Behn oil.

Bench Gas. See Coal gas.

Bengal Gelatin. See Agar-agar.

Bengal Isinglass. See Agar-agar.

Bengal Kino. See Butae gum.

Bengal Lights. A mixture of realgar, potassium nitrate and sulfur.

Beni Oil. See Sesamé oil.

Benitoite $BaTi(SiO_3)_3$.
A natural barium-titanium silicate which was formerly cut and sold as sapphire (q.v.). Color, deep blue (violet tint) to blue or light blue, sometimes colorless.

Benjamin Gum. See Benzoin gum, Siam.

Benjamin Oil. An oil obtained from benzoin after subliming benzoic acid.

Benne Oil. See Sesamé oil.

Bentonite (Wilkinite; Colloidal clay).
A bedded plastic clay which swells immensely upon wetting.
Deformation point: Cone 5 to cone 7.
Occurrence: California, Montana, Utah, Wyoming.
Uses: Increasing plasticity of pottery clays; suspension agent in pottery glazes; bonding agent in graphite crucibles; pencil leads; ingredient of bonding clay used in electrical and chemical porcelain, abrasive wheels, etc.; bonding agent in molding sands.

Benzal Chloride. See Benzyl dichloride.

Benzalacetone. See Benzylidene acetone.

Benzaldehyde (Benzoic aldehyde; Bitter artificial oil of bitter almonds; Benzoyl hydride)
C_6H_5CHO.
Color and properties: Colorless or yellowish fragrant, volatile oil with odor resembling oil of bitter almonds.
Constants: Sp.gr. 1.0504; m.p. −13.5°C.; b.p. 179.9°C.
Miscible with alcohol, ether and fixed and volatile oils.
Derivation: (a) By heating benzal chloride under pressure with milk of lime and calcium carbonate.
(b) By treating benzene with a gaseous mixture of carbon monoxide and hydrogen chloride in presence of cuprous chloride or aluminum bromide.
(c) Oxidation of toluene with lead dioxide and sulfuric acid, followed by distillation.
Impurities: Chlorine derivatives.
Method of purification: Rectification.
Grades: Technical; f.f.c. (meaning "free from chlorine"); U.S.P.
Note: The specifications, especially regarding impurities, vary considerably for the grades used for dye manufacture from those used in perfumery.
Containers: 1, 5, 10 lb. bottles; 40 lb. carboys; 100, 475, 945 lb. drums.
Uses: Organic synthesis; flavoring compounds; production of synthetic perfumes; manufacture of cinnamic acid, benzoic acid; dyes.
Railroad shipping regulations: None.*

Benzaldehyde Green. See Malachite green.

Benzamine Lactate (Benzoylvinyldiacetonealkamine lactate; Eucaine lactate)
$C_{15}H_{21}NO_2 . C_3H_6O_3$.
Color and properties: White crystalline powder; slightly bitter taste.
Soluble in water and alcohol.
Derivation: Neutralization of benzoylvinyldiacetonalkamine with lactic acid.
Grades: Technical.
Containers: Glass bottles.
Uses: Production of eucaine.
Railroad shipping regulations: None.*

Benzaminic Acid. See Aminobenzoic acid, meta-.

Benzaminoacetic Acid. See Hippuric acid.

Benzanalgene. See Ethoxybenzoylaminoquinoline.

Benzanilide (Benzoylanilide; Phenylbenzamine)
$C_6H_5NH(COC_6H_5)$.
Color and properties: White to reddish crystals and powder, closely related to acetanilide, containing benzoyl in place of acetyl radical.
Constants: Sp.gr. 1.306; m.p. 160° to 162°C.
Soluble in alcohol and ether.
Derivation: From benzoic anhydride and aniline with caustic soda.
Method of purification: Crystallization.
Grades: Technical.
Containers: Kegs.
Uses: Medicine (antipyretic); intermediate in the synthesis of dyes, drugs and perfumes.
Railroad shipping regulations: None.*

Benzanthrone $C_{17}H_{10}O$.
Color and properties: Pale yellow needles.
Constants: M.p. 170°C.
Soluble in alcohol and other organic solvents.
Derivation: (1) From anthranol and glycerol by condensation by means of sulfuric acid (anthranol is made from anthraquinone). (2) From anthracene in sulfuric-acid solution by addition of glycerol and heating to 100° to 110° C. until the anthracene disappears. The reaction mass is then diluted with water, salted out and purified.
Method of purification: Crystallization from toluene.
Grades: Technical.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Benzene (Benzol; Phenyl hydride; Coal naphtha) C_6H_6.
Color and properties: Clear, colorless, inflammable liquid; characteristic odor; solidifies at 0°C. Benzene is usually sold commercially as benzol which consists essentially of the hydrocarbon, benzene, C_6H_6.
Constants: Sp.gr. 0.87843; m.p. 5.483°C.; b.p. 79.7°C.
Miscible in alcohol and ether; insoluble in water.
Derivation: (a) Illuminating gas and coke-oven gas are "scrubbed," by passing through oil which thus becomes saturated with benzene and toluene. The resulting oil is distilled, benzene and toluene being recovered, which are then separated by fractional distillation. (b) Coal-tar, after dehydration, is fractionally distilled yielding "light oil." On distilling this, the first runnings contain the crude benzene. This is successively washed with caustic soda, sulfuric acid and water, and again distilled.
Impurities: Toluene, xylene, tarry substances.
Grades: Crude; straw color; 50%; 90%; 100%; U.S.P.; C.P.
Containers: 1, 5 lb. bottles; various sizes of tin cans; 55, 110 gal. drums; 8,000-10,000 gal. tank cars.
Uses: Manufacture of nitrobenzene, from which aniline is prepared; chlorobenzene from which phenol is produced; benzenedisulfonic acid for the preparation of resorcinol; azobenzene for benzidine; synthetic indigo; manufacture of picric acid; solvent for fats and oils; enriching gases; artificial leather; linoleum and oilcloth; substitute for acetylene in autogenous welding and cutting; airplane dopes; varnishes and lacquers; solvent in asphaltum paints; purification of paraffin; preparation of synthetic drugs; process engraving and lithographing; rubber solvent; dye cleaning and special textile soaps; preserving starch and albumin solutions used for sizing; solvent for waxes and resins; miscellaneous organic preparations; solvent for motor fuel, alone or with other liquid fuels; paint and varnish removers.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Benzeneazoaniline. See Diazoaminobenzene.

Benzeneazobenzene. See Azobenzene.

Benzene Dibromide, Para-. See Dibromobenzene, para-.

Benzene, Dibromo-. See Dibromobenzene.

Benzene, Dichloro-. See Dichlorobenzene.

Benzene, Monochloro-. See Chlorobenzene.

Benzenemonosulfonic Acid. See Benzenesulfonic acid.

Benzenesulfonic Acid $C_6H_5SO_3H$.
Color and properties: Fine, deliquescent needles or large plates.
Constants: M.p. 65° to 66°C.; b.p. 137°C.
Soluble in water, alcohol and ether.
Derivation: By sulfonating benzene with fuming sulfuric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron drums.
Uses: Making phenol; organic synthesis.
Railroad shipping regulations: None.*

Benzenylaminothiophenol $C_6H_5CNC_6H_4S$.
Color and properties: Yellow needles; pleasant odor of tea roses and geranium.
Constants: M.p. 115°C.; b.p. 360°C.
Soluble in alcohol, ether, carbon bisulfide and dilute hydrochloric acid; insoluble in water.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Perfumery.
Railroad shipping regulations: None.*

Benzenyl Trichloride. See Benzotrichloride.

Benzidine (Benzidine base; Para-diaminodiphenyl) $C_6H_4NH_2NH_2C_6H_4$.
Color and properties: Grayish-yellow, crystalline powder.
Constants: M.p. 127°C.; b.p. 400°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: (a) By reducing nitrobenzene with zinc dust in alkaline solution followed by distillation.
(b) By elctrolysis of nitrobenzene, followed by distillation.
(c) Nitration of diphenyl followed by reduction of the product with zinc dust in alkaline solution, with subsequent distillation.
Method of purification: Crystallization.
Grades: Technical (paste, powder).
Containers: Paste, 500 lb. barrels; powder, 250 lb. barrels.
Uses: Organic synthesis; manufacture of dyes, especially of Congo red; detection of blood stains; stain for microscopic work; reagent to determine lignification of wood.
Railroad shipping regulations: None.*

Benzidine Base. See Benzidine.

Benzidinedicarboxylic Acid. See Diaminodiphenic acid.

Benzidine Sulfate (Para-diaminodiphenyl sulfate) $C_{12}H_{10}(NH_2)_2SO_4H_2$.
Color and properties: White crystalline powder.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: Action of sulfuric acid and sodium sulfate on benzidine with subsequent recovery by precipitation.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Benzil (Dibenzoyl) $C_6H_5CO.COC_6H_5$.
Color and properties: Yellow needles.
Constants: M.p. 95° C.; b.p. 346° to 348° C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From benzoin by oxidation with nitric acid.
Method of purification: Crystallization from alcohol.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Benzine. See Petroleum ether. Note: Do not confuse with benzene (C_6H_6), known commercially as benzol.

Benzinum Purificatum, U.S.P. See Petroleum ether.

Benzocaine. See Ethyl-para-aminobenzoate.

Benzocaine, Anesthesin. See Ethylaminobenzoate.

Benzocaine Benzoate (Ethacaine) $C_6H_4NH_2COOC_2H_5HOOCC_6H_5$.
Color and properties: White crystalline product.
Soluble in fixed oils and alcohol; sparingly soluble in water.
Constants: M.p. 70.5°C.
Uses: Local anesthetic and antiseptic.
Railroad shipping regulations: None.*

Benzofurane Resin. See Para-coumarone.

Benzoglycolic Acid. See Amygdalic acid.

Benzoic Acid (Phenylformic acid) C_6H_5COOH.
Color and properties: White scales or needle crystals with odor of benzoin or benzaldehyde.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 1.2659; m.p. 121.25°C.; b.p. 249.2°C.
Soluble in alcohol, ether, chloroform, benzene, carbon bisulfide, carbon tetrachloride, and turpentine; slightly soluble in water.
Derivation: (a) From gum benzoin by sublimation, or by treatment with milk of lime and then distillation with sulfuric acid. The product is subsequently recovered by sublimation. (b) (1) Synthetically from toluene as a by-product in making benzaldehyde, in which process much benzaldehyde is converted into benzyl alcohol and calcium benzoate, from which latter benzoic acid is obtained. (2) Chlorinating of hot toluene followed by treatment with milk of lime and decomposition of calcium benzoate thus formed. (3) By the direct oxidation of toluene by manganese persulfate or precipitated manganese dioxide, and sulfuric acid. The benzoic acid is distilled by steam and allowed to crystallize.
Method of purification: Sublimation.
Grades: Technical; C.P.; U.S.P.; from gum benzoin; from toluene (ex.tol.).
Containers: 1, 4 oz., 1 lb. cartons; 50 lb. kegs; 100, 150 lb. barrels.
Uses: Dentifrices; seasoning tobacco; aniline dyes; perfumes; textiles; preservatives; medicine (germicide); chemicals (benzoates); mordant in calico printing; seasoning tobacco and improving the aroma.
Railroad shipping regulations: None.*

Benzoic Aldehyde. See Benzaldehyde.

Benzoic Ether. See Ethyl benzoate.

Benzoic Sulfimide, Ortho-. See Saccharin.

Benzoic Trichloride. See Benzotrichloride.

Benzoin (Phenylbenzoylcarbinol; Oxyphenylbenzylketone) $C_6H_5CH(OH)COC_6H_5$.
Condensation product of benzaldehyde in presence of aqueous potassium cyanide; yellowish crystals; used in medicine. Do not confuse with gum benzoin.

Benzoin Gum, Siam (Benzoin Siam; Benjamin gum; Benzoin resin; Bitter almond oil camphor).
Color and properties: Almond-shaped, pale, reddish-brown tears.
Chief constituents: An ethereal oil, benzoic acid, vanillin, resins.
Derivation: Balsamic resin from styrax benzoin and other species.
Habitat: Siam, Cambodia, Cochin-China and Sumatra.
Soluble in warm alcohol and carbon bisulfide; insoluble in water.
Grades: Technical; U.S.P.
Containers: Tins.
Uses: Medicine; perfumery; cosmetics.
Railroad shipping regulations: None.*

Benzoin Gum, Sumatra.
Differs from benzoin gum, Siam, in many respects. The odor is not so strong and it does not melt so easily. Generally contains 12% to 15% of woody matter.
Chief constituents: Cinnamic acid, benzoic acid, vanillin, resins.
Soluble in warm alcohol and carbon bisulfide; insoluble in water.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Cinnamic acid; varnishes.
Railroad shipping regulations: None.*

Benzol. See Benzene.

Benzol 160°. See Naphtha, solvent.

Benzol Black. See under Blacks.

Benzolaminoacetic Acid. See Hippuric acid.

Benzolazoaniline. See Diazoaminobenzene.

Benzole. See Benzene.

Benzoline. The more volatile portion obtained on redistilling benzine of boiling point (about) 70° to 95°C. Often used as synonymous with benzine.

Benzolsulfonic Acid. See Benzenesulfonic acid.

Benzonaphthol (Naphthol benzoate, beta-; benzoyl naphthol) $C_6H_5COOC_{10}H_7$.
Color and properties: White crystalline powder, odorless, tasteless; darkens with age. Incompatible with antipyrine, camphor, ferric chloride, menthol, phenol, potassium permanganate, ethyl carbonate.
Constants: M.p. 110°C.
Soluble in chloroform and in alcohol (more so in hot); almost insoluble in water.
Derivation: Interaction of benzoyl chloride and beta-naphthol.
Uses: Medicine (intestinal fermentations, chronic diarrhea, senile pruritus, unofficial).
Railroad shipping regulations: None.*

Benzonitrile (Phenyl cyanide) C_6H_5CN.
Color and properties: Transparent, colorless oil; odor of essential oil of almonds.
Constants: Sp.gr. 1.0051; b.p. 191.3°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From benzoic acid by heating with lead sulfocyanate.
Method of purification: Distillation.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Benzophenone (Diphenylketone) $(C_6H_5)_2CO$.
Color and properties: Colorless prisms.
Constants: Sp.gr. 1.0976; m.p. 48°C.; b.p. 305.9°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From calcium benzoate by dry distillation.
Method of purification: Crystallization from alcohol.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis; perfumes (fixative).
Railroad shipping regulations: None.*

Benzopurpurin (Eclipse). A red substantive dye formed by combining naphthionic acid with the diazo compound of ortho-toluidine. (Brownish-red powder.) Used in dyeing wool and silk; various shades known by combinations of letters and numbers, such as 4B, 10B, etc., placed after the name.

Benzoquinone. See Quinone.

Benzosalin (Methylbenzoyl salicylate; Benzoyl salicylic methyl ester) $C_6H_5COOC_6H_4COOCH_3$.
Color and properties: White, acicular crystals; incompatible with acids or highly acid salts.
Constants: M.p. 85° C.
Soluble in alcohol and chloroform; slightly soluble in ether; insoluble in water.
Uses: Medicine (antirheumatic, antineuralgic, antineuritic, unofficial).
Railroad shipping regulations: None.*

Benzosol. A proprietary name for guaiacol benzoate (q.v.).

Benzosulfimide. See Saccharin.

Benzotrichloride (Toluene trichloride; Benzenyl trichloride; Benzoic trichloride; Phenylchloroform) $C_6H_5CCl_3$.
Color and properties: Colorless to yellowish liquid; characteristic, penetrating odor.
Constants: Sp.gr. 1.38; b.p. 213° to 214°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the chlorination of boiling toluene.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Synthetic dye industry.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Benzoxate. See Acetylbenzyl peroxide.

2-Benzoxy-2-dimethylaminomethyl-1-dimethylaminobutane Hydrochloride. See Alypin.

Benzoylanilide. See Benzanilide.

Benzoyl Chloride C_6H_5COCl.
Color and properties: Transparent, colorless pungent liquid; vapor causes tears.
Constants: Sp.gr. 1.2188; m.p. 0.5°C.; b.p. 197.2°C.
Soluble in ether and carbon bisulfide; decomposes in water.
Derivation: By the chlorination of benzaldehyde and subsequent distillation.
Method of purification. Redistillation.
Grades: Technical; C.P.
Containers: 1 lb. bottles; returnable carboys of 50 and 100 lbs. net.
Uses: Intermediates.
Railroad shipping regulations: White label.

Benzoyldimethylaminoethylpropanol Hydrochloride. See Stovaine.

Benzoylglycin. See Hippuric acid.

Benzoylglycocoll. See Hippuric acid.

Benzoyl Hydride. See Benzaldehyde.

Benzoylmethide. See Acetophenone.

Benzoylnaphthol. See Benzonaphthol.

Benzoyl Peroxide $C_{14}H_{10}O_4$.
Color and properties: White crystalline substance.
Constants: M.p. 103.5°C.
Soluble in oil.
Uses: As a bleach for flour, fats, oils, and waxes. Also in medicine in antiseptic ointment.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Benzoylphloroglucinolmethylether. See Cotoin.

Benzoylsalicylic Methyl Ester. See Benzosalin.

Benzoylsulfonic Imide. See Saccharin.

Benzoylvinyldiacetonealkamine. See Eucaine, beta-.

Benzoylvinyldiacetonealkamine Lactate. See Benzamine lactate.

Benzozone. See Acetylbenzyl peroxide.

Benzyl Acetate $C_6H_5CH_2OOCCH_3$.
Color and properties: A water-white liquid with a pleasant flowery odor which should not be stale, flat or sharp in a well-manufactured product. The odor should not change on keeping or on exposure to air or on evaporation. Should give a negative test for chlorine by all qualitative methods.
Constants: Sp.gr. 1.059; b.p. 212°C.
Soluble in alcohol and ether; almost insoluble in water.
Derivation: (a) By treating benzyl chloride with acetate of soda in various solvents. (b) By esterification of benzyl alcohol with acetic anhydride or acetic acid.
Method of purification: By distillation.
Grades: Free-from-chlorine grade which should have an ester content of 97% but for which lower grade material is sometimes substituted; technical grade which is not free from chlorine and for which ester content varies considerably.
Containers: 55 gal., 100 lb. tinned drums; carboys; cans; bottles.
Uses: Essential ingredient of artificial jasmine and many other flowery perfumes; soap perfume; in some flavors; solvent and high boiler for cellulose acetate and nitrate.
Railroad shipping regulations: None.*

Benzyl Alcohol $C_6H_5CH_2OH$.
Color and properties: A water-white liquid with a faint aromatic odor which in the course of time, especially on exposure to air, smells slightly of benzaldehyde.
Constants: Sp.gr. 1.043; b.p. 206.5°C.
Should be completely soluble in about 10 parts of water; soluble in alcohol and ether.
Derivation: (a) By hydrolysis of benzyl chloride. (b) By hydrolysis of other benzyl esters, such as benzyl acetate. (c) By Cannizaro method from benzaldehyde.
Method of purification: Distillation and chemical treatment.
Grades: Free-from-chlorine; technical.
Containers: 55 gal. tinned drums; 100 lb. drums; carboys; cans.
Uses: Solvent in perfumery and flavoring materials; intermediate in preparing other benzyl esters and ethers; high-boiling solvent in cellulose acetate products; medicine (very mild local anesthetic and antispasmodic).
Railroad shipping regulations: None.*

Benzylamine (Benzylphenylamine) $C_6H_5CH_2NH_2$.
Color and properties: Colorless liquid; strongly alkaline reaction.
Constants: Sp.gr. 0.9813; b.p. 184.5°C.
Soluble in alcohol, ether and water.
Derivation: By the reduction of thiobenzamine by nascent hydrogen.
Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Benzylaniline $C_6H_5NHCH_2C_6H_5$.
Color and properties: Colorless prisms.
Constants: M.p. 33°C.; b.p. 310°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating aniline with benzyl chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Benzylbenzene. See Diphenylmethane.

Benzyl Benzoate $C_6H_5CH_2OOCC_6H_5$.
Color and properties: A water-white liquid which readily freezes to a solid. Has a faint aromatic, pleasant odor which should not be harsh or have any trace of benzaldehyde or toluene odor even after long standing. Supercools easily.
Constants. Sp.gr. 1.119; b.p. 325°C.; m.p. 20°C.; should be free from even traces of chlorine and have less than 0.03% free acid.
Insoluble in water; soluble in alcohol and ether.
Derivation: (a) By a Cannizaro reaction from benzaldehyde. (b) By esterifying benzyl alcohol with benzoic acid. (c) By treating benzoate of soda with benzyl chloride.
Method of purification: By distillation and crystallization.
Grades: Free-from-chlorine grade (minimum ester content 98%).
Containers: 55 gal. drums (tinned); 100 lb. drums; cans; bottles.
Uses: Fixative and solvent for musk in perfumes and flavors; medicine (antispasmodic, etc.).
Railroad shipping regulations: None.*

Benzyl Bichloride. See Benzyl dichloride.

Benzyl Bromide $C_6H_5CH_2Br$. A military poison gas used in the late war.

Benzyl Carbinol. See Phenylethyl alcohol.

Benzyl Chloride (Omega chlorotoluene; Omega chlorotoluol). $C_6H_5CH_2Cl$.
Color and properties: Colorless liquid; aromatic odor.
Constants: Sp.gr. 1.1027; m.p. −41.2°C.; b.p. 179°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By passing chlorine over boiling toluene until it has increased 38% in weight. The product is washed with water and separated by fractional distillation.
Method of purification: Redistillation.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical; C.P.
Containers: 1 lb. bottles; 100, 150, 200 lb. carboys; 450, 925 lb. drums (with soda ash and water).
Uses: Dyes; intermediates; benzyl compounds; synthetic tannins; perfumery; pharmaceuticals; manufacture of duratol photographic developer; synthetic resins.
Railroad shipping regulations:, White label.

Benzyl Cyanide (Phenylacetic acid and nitrile) $C_6H_5CH_2CN$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 1.0157; m.p. —24.6°C.; b.p. 233.5°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of benzyl chloride and potassium cyanide.
Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Benzyl Dichloride (Benzylidene chloride; Benzyl bichloride; Benzal chloride; Benzylene chloride; Chlorobenzal) $C_6H_5CHCl_2$.
Color and properties: Colorless oily liquid; faint aromatic odor.
Constants: Sp.gr. 1.295; m.p. 16.1°C.; b.p. 212.4°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the chlorination of toluene, until two formula weights of chlorine are absorbed.
Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums.
Uses: Dyes: substitute for mustard gas in Chemical Warfare Service shell experiments, on account of similarity of physical properties.
Railroad shipping regulations: None.*

Benzylidene Acetone (Benzalacetone; Acetocinnamone; Methylcinnamyl ketone; Methylstyryl ketone) $C_6H_5CHCHCOCH_3$.
Color and properties: Colorless crystals; odor of coumarin.
Constants: M.p. 42°C.
Soluble in alcohol, ether, benzene and chloroform; insoluble in water.
Derivation: By the condensation of benzaldehyde and acetone.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tin cans; iron drums.
Uses: Organic synthesis; perfumery (fixative, balsamic odors, artificial essence of sweet pea).
Railroad shipping regulations: None.*

Benzylidine Chloride. See Benzyl dichloride.

Benzyl Iodide $C_6H_5CH_2I$.
Color and properties: Colorless crystals; vapors cause tears.
Constants: Sp.gr. 1.7335; m.p. 34.1°C.; b.p.: Decomposes.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of benzyl chloride and hydriodic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Benzylphenylamine. See Benzylamine.

Benzyl Succinate (Esterol) $C_6H_5CH_2OOCCH_2CH_2COOCH_2C_6H_5$.
Color and properties: White crystalline powder.
Constants: M.p. 45°C.
Soluble in alcohol, ether, chloroform, also in fixed and volatile oils.
Uses: In medicine as an antispasmodic on smooth muscle.
Railroad shipping regulations: None.*

Benzyl Sulfide $(CH_2C_6H_5)_2S$.
Color and properties: Colorless tablets.
Constants: Sp.gr. 1.0712; m.p. 49°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the action of potassium sulfide on benzyl chloride and subsequent distillation.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Berberine $C_{20}H_{17}O_4N \cdot 6H_2O$.
Color and properties: White to yellow crystals; poisonous alkaloid!
Constants: M.p. 145°C.
Soluble in water and alcohol; very slightly soluble in ether.
Derivation: From the berries of Berberis vulgaris, by extraction and subsequent crystallization. The salts of this alkaloid are obtained by the action of the respective acid on the alkaloid.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1 oz. vials; 1 lb. bottles.
Uses: Medicine (bitter tonic and mild laxative; in form of alkaloid or its sulfate or hydrochloride).
Railroad shipping regulations: None.*

Berberis (Oregon grape root; Rocky Mountain grade).
Derivation: Dried rhizome and roots of Berberis aristata. Native to Europe, Asia and western United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (bitter tonic and mild laxative).
Railroad shipping regulations: None.*

Berengelite.
A bituminous, resinous mineral.
Constants: M.p. 100°C.
Soluble in alcohol and ether.
Habitat: Trinidad, Chile.
Uses: Caulking ships.

Bergamaskite. See Hornblend.

Bergamiol. See Linalyl acetate.

Bergamot Oil.
Color and properties: Brownish-yellow or honey-colored liquid often colored green by copper content; agreeable odor; bitter taste. Linalyl acetate content 34 to 45% (usually 34 to 40%).
Chief known constituents: Limonene; linalyl acetate; linalool; terpineol.
Constants: Sp.gr. 0.881 to 0.886 (rarely 0.888) at 15°C.; optical rotation +8° to +22° (occasionally +5° 24′ and +24°); refractive index 1.464 to 1.468; acid value 1 to 3.5; evaporation residue 4.5 to 6% (occasionally 4%); acid value of evaporation residue 19 to 30.
Solubility in alcohol: In 1 vol. of 90% alcohol.
Derivation: By expression from the fruits of Citrus bergamia, Risso.
Adulteration: Turpentine, lemon, orange oils; distilled bergamot oil; fatty oils; cedarwood oil; gurjun-balsam oil.
Uses: Perfumery.
Railroad shipping regulations: None.*

Bergamot Oil, Terpeneless.
Concentration: About 2.5 to 3 times that of the ordinary bergamot oil.
Constants: Sp.gr. 0.883 to 0.888; optical rotation —7° to —10°.
Solubility in alcohol: 9 vols. in 100 vols. of 60% alcohol; 50 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Berlin Blue. See Iron blues.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Berlin Red.
A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Berry Alder. See Frangula.

Bertram. See Pyrethrum root.

Beryl $Gl_3Al_2(SiO_3)_6$. Sometimes with replacement of Gl by Na, Li, Cs. A natural metasilicate of glucinum and aluminum. Color, various shades of green, blue, yellow, red, white, or colorless; white streak; vitreous luster.
Constants: Sp.gr. 2.63 to 2.8; hardness 7.5 to 8.
Varieties: Emerald—Bright emerald green color due to some chromium. Aquamarine—Sky blue to greenish blue color. Morganite—Pink color. Heliodor—Golden color.
Occurrence: United States (New Hampshire, Massachusetts, Maine, North Carolina, South Dakota, Connecticut). Russia, Brazil, India, Australia, Columbia, South Africa.
Uses: Source of glucinum salts; gem stone.

Beryllium. See Glucinum.

Beryllium Nitrate. See Glucinum nitrate.

Beryllium Oxide. See Glucinum oxide.

Beryllonite $NaGlPO_4$.
A natural sodium glucinum phosphate. Colorless, white or light yellow.
Constants: Sp.gr. 2.84; hardness 5.5 to 6.
Occurrence: United States (Maine).
Uses: Sometimes used as a gem stone.

Bessemer Pig, Acid Process. A pig iron made from low-phosphorus ores. Both phosphorus and sulfur must be below 0.05%. The following are typical Bessemer pig irons from various countries:
United States: Low silicon (under 1.00%); low manganese (under 0.5%).
Sweden: Low silicon (under 1.0%); high manganese (from 2.4%).
Great Britain: High silicon (from 2 to 2.5%); low manganese (0.75% and less).
In addition to the above occasionally high silicon (2% and over) and high manganese (2%) are used.

Bessemer Pig, Basic Process. A pig iron containing from 0.5 to 1.0% silicon, 2.5 to 3.00% phosphorus, about 2.0% manganese, and 0.5 to 0.1% sulfur.

Beta Compounds. See Alpha compounds. For Beta compounds see under specific compound, e.g., Beta-naphthol see Naphthol, Beta-.

Betaine (Trimethyl glycocoll) $C_5H_{11}O_2N$. The alkaloid of the sugar beet; colorless crystals produced by a patented process from beet sugar molasses after separation of other crystallizable bodies; used in medicine, usually in the form of the hydrochloride, with doubtful value.

Betanol. The trade name for an oil used in the production of para-reds, giving a bluer, bloomier shade.

Betel.
Derivation: Dried leaves of Piper betel, a climbing shrub found in India, Malay region; cultivated in Madagascar, West Indies.
Grades: Technical.
Containers: Bags.
Uses: Medicine (treatment of respiratory diseases); source of betel oil.
Railroad shipping regulations: None.*

Betel Leaves Oil.
Color and properties: Light yellow to dark brown, volatile oil; aromatic, somewhat creosote-like odor; sharp burning taste. Characteristic constituent, betolphenol.
Constants: Sp.gr. 0.958 to 1.057 at 15°C.; optical rotation, levogyrate up to $-1° 55'$, dextrogyrate up to $+2° 53'$.
Soluble in alcohol.
Derivation: By distilling betel leaves.
Uses: None.
Railroad shipping regulations: None.*

Betel Nut. See Areca nut.

Beth Root. See Trillium.

Betol. See Naphthylsalicylate, beta-.

Béton. See Concrete.

Betonica. See Betony wood.

Betony Wood (Betonica).
A perennial European herb, faintly aromatic and astringent. Root used in medicine (unofficial) as an emetic and purgative.

Bettendorf's Reagent. A reagent used for the detection of arsenic. It consists of a concentrated solution of stannous chloride in fuming hydrochloric acid.

Betula Oil (Sweet-birch oil).
Color and properties: Colorless or yellowish liquid sometimes colored red by traces of iron. Characteristic odor and taste hardly distinguishable from that of methyl salicylate.
Chief known constituents: Methyl salicylate (99.8%), and a paraffin.
Constants: Sp.gr. 1.180 to 1.188; optically inactive.
Solubility in alcohol: In 5 to 8 vols. of 70% alcohol.
Derivation: By distillation of the bark and twigs of Betula lenta, L. Note: Sometimes mountain-tea or wintergreen leaves are also added, but the Pure Food and Drugs Act requires that they be kept separate, the designation of sweet-birch oil as wintergreen oil being a violation of this law. For wintergreen oil see Gaultheria oil.
Uses: Flavoring agent.
Railroad shipping regulations: None.*

Betulin. A birch-bark resin.

Bi—. See also Di—.

Bibirine. See Bebeerine.

Bicalcic Phosphate. See Calcium phosphate, dibasic.

Bicarburetted Hydrogen. See Ethylene.

Bichloroacetic Acid. See Dichloroacetic acid.

Big Reds. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
1	A	I a
7	A	I a

Railroad shipping regulations: High explosive.

Bilberry. See Vaccinium.

Bilifulvin. See Bilirubin.

Bilifuscin $C_{16}H_{20}N_2O_4$.
Color and properties: Dark-brown powder.
Soluble in alcohol, glacial acetic acid and alkalis; insoluble in water.
Derivation: From bile pigment.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Biliphaein. See Bilirubin.

Bilirubin (Biliphaein; Bilifulvin; Cholepyrrhin; Hematoidin) $C_{16}H_{18}N_2O_3$.
Color and properties: Orange-red powder.
Constants: M.p. 192°C.
Soluble in acids, alkalis, chloroform and benzene; insoluble in water.
Derivation: From bile pigment.
Method of purification: Crystallization.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.

Containers: Glass bottles; tins.

Uses: Analytical chemistry.

Railroad shipping regulations: None.*

Bindheimite. A natural hydrous antimonate of lead; an oxidation product of jamesonite. Nevada.

Binitrobenzene. See Dinitrobenzene.

Binitrobenzol. See Dinitrobenzene.

Binitronaphthalene. See Dinitronaphthalene.

Binitrotoluene. See Dinitrotoluene.

Binitrotoluol. See Dinitrotoluene.

Binnite. See Tennantite.

Biotite. See Mica.

Birch-bark Rubber. A dense, black gum from the outer layers of the birch tree, possessing the usual properties of gutta-percha.

Birch Oil (Birch-tar oil).

Yellowish-brown liquid; characteristic odor like that of Russia leather; poisonous!

Chief known constituents: Phenols, guaiacol, cresol, creosol, xylenol.

Constants: Sp.gr. 0.956.

Soluble in alcohol, ether, chloroform, glacial acetic acid, amyl alcohol, benzene, carbon bisulfide, oil of turpentine.

Derivation: Distilled from birch-tar, obtained from the dry distillation of the wood of Betula alba.

Method of purification: Rectification.

Grades: Technical; N.F.

Containers: Iron drums; tins.

Uses: Leather dressing; disinfectant; medicine (in skin diseases).

Railroad shipping regulations: None.*

Birch Oil, Sweet. See Betula oil.

Birch-tar Oil. See Birch oil.

Bird Glue. See Bird lime.

Bird Lime (Bird glue).

A greenish viscid glutinous substance existing in the bark of the mistletoe (Viscum album), European holly (Ilex aquifolium) and other plants. Exposed to air in thin layers it becomes dry and pulverizable, but becomes viscid again upon addition of water.

Soluble in water, ether, benzene.

Uses: Adhesive; medicine (vehicle for dermatological remedies).

Bird Pepper. See Capsicum.

Birth-wort. See Serpentaria.

Bisabol. See Bissabol.

Bisabolene (Limene).

A monocyclic sesquiterpene found in bissabol myrrh oil, Siberian pine-needle oil, camphor oil, lime oil, lemon oil, bergamot oil, opopanax oil, and oil of Piper volkensii.

Constants: (1) Fractionated from lemon oil: Sp.gr. 0.8813 at 15°C.; b.p. 110 to 112°C. (4 mm.); optical rotation —41° 31′; refractive index 1.49015. (2) Regenerated from the trichlorhydrate: Sp.gr. 0.8759 at 15°C.; b.p. 261° to 262°C. (751 mm.); optical rotation +0°; refractive index 1.4901.

Bischofite. A natural hydrated magnesium chloride.

Bismal (Bismuth methylene digallate) $4C_{15}H_{12}O_{10}\cdot 3Bi(OH)_3$.

Color and properties: Yellow or grayish-brown powder, becoming darker with age.

Soluble in alkaline solutions; insoluble in water and gastric juice.

Uses: Medicine (astringent in diarrhea, unofficial).

Railroad shipping regulations: None.*

Bismite (Bismuth ocher) Bi_2O_3.

Yellowish or gray powder or earthy mass of dull luster. Forms part of the bismuth of some deposits but generally is only a coating on other bismuth species. Analyses of a number of Californian bismuth ochers show these to be either bismuth hydroxide, $Bi(OH)_3$, or pucherite, $BiVO_4$, or mixtures of these and doubt has been expressed as to the occurrence of the native, pure oxide Bi_2O_3.

Occurrence: United States (California, Colorado), Australia.

Bismon (Bismuth oxide, colloidal)

Color and properties: Translucent, amorphous mass. Contains 22.3% bismuth oxide. Cannot be used hypodermically.

Soluble in water.

Derivation: Interaction of bismuth salts and alkaline solutions of sodium lysalbinate or protalbinate.

Uses: Medicine (gastro-intestinal catarrh in children, unofficial).

Railroad shipping regulations: None.*

Bismuth Bi.

Color and properties: Grayish-white, hard, brittle metal, with a reddish tinge; sometimes found native. See also bismuthinite, bismutite, cosalite and tetradymite.

Constants: Sp.gr. 9.823 at 12°C.; m.p. 268°C.; b.p. 1,420°C.; hardness 2 to 2.5.

Soluble in hydrochloric acid (in presence of oxygen), hot concentrated sulfuric acid and nitric acid; insoluble in water.

Derivation: The ores are roasted to remove sulfur and then reduced by fusing in crucibles with coal, iron and flux.

Impurities: Lead, iron, copper, arsenic, antimony, selenium.

Forms available: 25 lb. bars; 500 lb. lots for 99.9% grade; 150 lb. wooden boxes for alloy grade; C.P. powder.

Uses: Low-melting alloys (Wood, Rose and Newton's metals); metallic coating of other metals; bismuth salts (almost all of which are used in medicine); dentistry; ceramics (porcelain and chinaware colors).

Railroad shipping regulations: None.*

Bismuth Albuminate. See Bismuthose.

Bismuth-ammonium Citrate.

Color and properties: Pearly, shining, transparent scales or white powder; slightly acid, metallic taste; composition varies.

Soluble in water; slightly soluble in alcohol.

Derivation: By the interaction of bismuth subnitrate, citric acid and ammonium hydroxide.

Grades: Technical.

Containers: Tins; amber glass bottles.

Uses: Medicine (active astringent).

Railroad shipping regulations: None.*

Bismuth Benzoate $Bi(C_7H_5O_2)_3$.

Color and properties: White, tasteless powder.

Soluble in mineral acids; insoluble in water.

Derivation: By the interaction of a bismuth salt and sodium benzoate.

Grades: Technical.

Containers: Glass bottles; tins.

Uses: Medicine (substitute for iodoform).

Railroad shipping regulations: None.*

Bismuth Beta-naphtholate. See Orphal.

Bismuth Bisalicylate (Gastrosan).

Color and properties: White powder.

Insoluble in water and alcohol.

Uses: Medicine (intestinal ferment, unofficial).

Railroad shipping regulations: None.*

Bismuth Bitannate. See Tannismuth.

Bismuth Carbolate. See Bismuth phenate.

Bismuth "Carbonate." See Bismuth subcarbonate.

Bismuth Chloride (Bismuth trichloride) $BiCl_3$.

Color and properties: White, very deliquescent crystals; volatilized by heat.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 4.56; m.p. 227°C.; b.p.: Decomposes at 300°C.
Soluble in acids; insoluble in alcohol; decomposes in water to the oxychloride.
Derivation: By the action of hydrochloric acid on bismuth.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Bismuth salts.
Railroad shipping regulations: None.*

Bismuth Chromate $Bi_2O_3.2CrO_3$.
Color and properties: Orange-yellow amorphous powder.
Soluble in alkalis; insoluble in water.
Derivation: By the interaction of bismuth nitrate and potassium chromate.
Grades: Technical.
Containers: Tins; kegs.
Uses: Pigment.
Railroad shipping regulations: None.*

Bismuth Chrysophenate. See Dermol.

Bismuth Citrate $BiC_6H_5O_7$.
Color and properties: White powder.
Soluble in ammonia or alkali citrates.
Derivation: Boiling bismuth subnitrate with citric acid.
Uses: Pharmacy (preparation of double citrates).
Railroad shipping regulations: None.*

Bismuth, Cosmetic. See Bismuth oxychloride.

Bismuth Dilactotannate. See Lactanin.

Bismuth Ditannate. See Tannismuth.

Bismuth Ditelluride. See Wehrlite.

Bismuth Dithiosalicylate (Thioform; Deltaform) $SC_6H_3OHCOOBiO_2Bi_2O_3.2H_2O$.
Color and properties: Yellowish-gray powder, odorless, tasteless. Contains 72% bismuth oxide.
Insoluble in water, alcohol and ether.
Uses: Medicine (astringent and antiseptic, dusting powder in skin diseases and surgery, ocular troubles, diarrhea, unofficial).
Railroad shipping regulations: None.*

Bismuth Gallate, Basic. See Bismuth subgallate.

Bismuth Glance. See Bismuthinite.

Bismuth Hydrate. See Bismuth hydroxide.

Bismuth Hydroxide (Bismuth hydrate; Bismuth trihydroxide; Bismuth trihydrate; Hydrated bismuth oxide) $Bi(OH)_3$.
Color and properties: White, amorphous powder.
Soluble in acids; insoluble in water.
Derivation: By the action of sodium hydroxide on a solution of a bismuth salt.
Grades: Technical; C.P.
Containers: Glass bottles; tins; barrels.
Uses: Bismuth salts.
Railroad shipping regulations: None.*

Bismuth Iodide (Bismuth triïodide) BiI_3.
Color and properties: Grayish-black, metallic, glistening crystals.
Constants: Sp.gr. 5.65; m.p. 408°C.
Soluble in alcohol, hydriodic acid and potassium iodide; insoluble in water.
Derivation: By the interaction of bismuth chloride and potassium iodide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry; bismuth oxyiodide.
Railroad shipping regulations: None.*

Bismuth Lactate $BiH(C_3H_4O_3)_2$.
Color and properties: White powder.
Slightly soluble in water.
Uses: Medicine (treatment of diarrhea, unofficial).
Railroad shipping regulations: None.*

Bismuth Magistery. See Bismuth subnitrate.

Bismuth Methylene Digallate. See Bismal.

Bismuth Nitrate (Bismuth ternitrate; Bismuth trinitrate) $Bi(NO_3)_3.5H_2O$.
Color and properties: Lustrous, clear, colorless, hygroscopic crystals; acid taste.
Constants: Sp.gr. 2.78; m.p. 74°C.; b.p.: Decomposes 75° to 80°C.
Soluble in dilute nitric acid, alcohol and acetone; slowly decomposed by water to the subnitrate.
Derivation: By the action of nitric acid on bismuth, with subsequent recovery by evaporation and crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; tins; kegs.
Uses: Preparation of other bismuth salts; bismuth luster on tin; luminous paints and enamels.
Railroad shipping regulations: None.*

Bismuth Nitrate, Basic. See Bismuth subnitrate.

Bismuth Nucleinate. See Bismuth, para-.

Bismuth Ocher. See Bismite.

Bismuth Oleate.
Color and properties: Yellowish-brown, soft, granular mass.
Soluble in ether.
Derivation: A combination of bismuth trioxide and oleic acid.
Grades: Technical.
Containers: Tins.
Uses: Medicine (emollient, astringent).
Railroad shipping regulations: None.*

Bismuth Oxide. See Bismuth trioxide.

Bismuth Oxide, Colloidal. See Bismon.

Bismuth Oxide, Hydrated. See Bismuth hydroxide.

Bismuth Oxycarbonate. See Bismuth subcarbonate.

Bismuth Oxychloride (Bismuth subchloride; Cosmetic bismuth; Pearl white) $BiOCl$.
Color and properties: White, lustrous crystalline powder.
Constants: Sp.gr. 7.717.
Soluble in acid; insoluble in water.
Derivation: By the action of water on bismuth chloride; interaction of dilute nitric acid solution of bismuth nitrate with sodium chloride.
Grades: Technical; C.P.
Containers: Tins; glass bottles; wooden kegs.
Uses: Medicine; face powder; pigment; artificial pearls.
Railroad shipping regulations: None.*

Bismuth Oxyiodogallate (Airogen; Airol) $C_6H_2(OH)_3COO(BiOHI)$.
Color and properties: Grayish-green powder, odorless, tasteless; contains 44.6% bismuth trioxide, 24.3% iodine; incompatible with water, dilute acids, and dilute alkalis. Must be kept dry! Moist air causes liberation of iodine! Used as a powder or 10 to 20% salve made from water-free lard or vaseline.
Slightly soluble in glycerol; insoluble in alcohol, ether, chloroform and olive oil.
Derivation: (a) By heating hydriodic acid and bismuth subgallate. (b) By heating bismuth oxyiodide and gallic acid.
Uses: Medicine (substitute for iodoform, wounds, catarrhs, gonorrheal opthalmia, tubercular abscesses, unofficial).
Railroad shipping regulations: None.*

Bismuth Oxyiodomethylgallol. See Iodogallicin.

Bismuth Oxyiodotannate. See Ibit.

Bismuth, Para- (Bismuth nucleinate)
Color and properties: Pale yellow powder, odorless. Contains approximately 50% bismuth.
Insoluble in water.
Uses: Medicine (antiseptic, acute and chronic enteritis, unofficial).
Railroad shipping regulations: None.*

Bismuth Peroxide. See Bismuth tetroxide.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Bismuth Phenate (Bismuth carbolate; Bismuth phenolate; Bismuth phenylate; Phenolbismuth) $C_6H_5O.Bi(OH)_2$.
Color and properties: Grayish-white powder; odorless and tasteless.
Insoluble in water, alcohol and ether.
Derivation: By the interaction of bismuth nitrate and sodium phenolate.
Grades: Technical, 80% Bi_2O_3.
Containers: Tins.
Uses: Medicine (intestinal antiseptic).
Railroad shipping regulations: None.*

Bismuth Phenolate. See Bismuth phenate.

Bismuth Phenolsulfonate (Bismuth sulfocarbolate; Bismuth sulfophenate; Bismuth sulfophenylate).
Color and properties: Pale, reddish powder.
Slightly soluble in water.
Derivation: By the interaction of bismuth hydroxide and phenolsulfonate.
Grades: Technical.
Containers: Tins.
Uses: Medicine, antiseptic.
Railroad shipping regulations: None.*

Bismuth Pyrogallate (Helcosol; Basic bismuth pyrogallate) $C_5H_3(OH)_2OBiOH$.
Color and properties: Yellowish-green amorphous powder; odorless; tasteless.
Soluble in dilute acid and alkaline solutions; insoluble in water and alcohol.
Derivation: By the action of pyrogallic acid on bismuth carbonate.
Grades: Technical, 60% Bi_2O_3.
Containers: Tins.
Uses: Medicine (intestinal antiseptic).
Railroad shipping regulations: None.*

Bismuth Pyrogallate, Basic. See Bismuth pyrogallate.

Bismuth Salicylate, Basic. See Bismuth subsalicylate.

Bismuth Solders. See table under Fusible metals.

Bismuth Subbenzoate $Bi(C_7H_5O_2)_3Bi(OH)_3$.
Color and properties: White powder.
Insoluble in water.
Uses: Medicine (dressing in treatment of ulcers, unofficial).
Railroad shipping regulations: None.*

Bismuth Subcarbonate (Bismuth oxycarbonate; Bismuth "carbonate") $(Bi_2O_2CO_3)_2.H_2O$.
Color and properties: White, odorless powder.
Constants: Sp.gr. 6.86.
Insoluble in water.
Derivation: By adding ammonium carbonate to a solution of a bismuth salt.
Grades: Technical; U.S.P.; C.P.
Containers: 1 lb. bottles; wooden barrels; tins.
Uses: Bismuth compounds; face powder; medicine (X-ray work, for its opacity).
Railroad shipping regulations: None.*

Bismuth Subchloride. See Bismuth oxychloride.

Bismuth Subgallate (Dermatol; Basic bismuth gallate) $C_6H_2(OH)_3COOBi(OH)_2$.
Color and properties: Saffron-yellow powder.
Soluble in dilute alkalis; insoluble in water, alcohol and ether.
Derivation: Interaction of bismuth nitrate, glacial acetic acid, and gallic acid in aqueous solution.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. cartons; tin cans.
Uses: Medicine (internally in diarrhea, externally for skin diseases).
Railroad shipping regulations: None.*

Bismuth Subnitrate (Magistery of bismuth; Basic bismuth nitrate; Spanish white) $BiONO_3.H_2O$.
Color and properties: White, heavy powder.
Constants: Sp.gr. 4.928; m.p.: Decomposes at 260°C.
Soluble in acids; insoluble in water.
Derivation: By adding bismuth nitrate to water, filtering and drying.
Impurities: Arsenic, lead, silver carbonates. First two especially should be watched for, if article is to be used in pharmacy or medicine.
Grades: Technical, not less than 80% Bi_2O_3, free from As, Pb, Sb or Ag; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; wooden barrels.
Uses: Bismuth salts; perfumery and cosmetics; ceramic enamels; burning gold on ceramic ware; bismuth luster on metals; pharmaceuticals (preparations, antiseptic and deodorizing compositions, drug).
Railroad shipping regulations: None.*

Bismuth Subsalicylate (Basic bismuth salicylate) $Bi(C_7H_5O_3)_3Bi_{12}O_3$.
Color and properties: White bulky, crystalline powder; tasteless.
Soluble in acids and alkalis; insoluble in water, alcohol and ether.
Derivation: By treating freshly prepared bismuth hydroxide with salicylic acid.
Grades: Technical; U.S.P.
Containers: Tins; barrels.
Uses: Medicine (intestinal or local antiseptic).
Railroad shipping regulations: None.*

Bismuth Sulfide Bi_2S_3.
Color and properties: Blackish-brown powder.
Constants: Sp.gr. 7.00 to 7.81; m.p.: Decomposes.
Soluble in nitric acid; insoluble in water.
Derivation: (a) By melting bismuth and sulfur together. (b) By passing hydrogen sulfide into a solution of a bismuth salt.
Grades: Technical.
Containers: Tins.
Uses: Bismuth compounds.
Railroad shipping regulations: None.*

Bismuth Sulfocarbonate. See Bismuth phenolsulfonate.

Bismuth Sulfophenate. See Bismuth phenolsulfonate.

Bismuth Sulfophenylate. See Bismuth phenolsulfonate.

Bismuth Tannate. See Tannismuth.

Bismuth, Telluric. See Grünlingite, Tetradymite, Wehrlite, and Joseïte.

Bismuth Ternitrate. See Bismuth nitrate.

Bismuth Tetraiodophenolphthalate. See Eudoxine.

Bismuth Tetroxide (Bismuth peroxide) Bi_2O_4.
Color and properties: Heavy, yellowish-brown powder.
Constants: Sp.gr. 5.6; m.p. 305°C.
Soluble in acids; insoluble in water.
Derivation: By further oxidation of bismuth trioxide.
Grades: Technical; C.P.
Containers: 1 lb. bottles; tins.
Uses: Bismuth salts.
Railroad shipping regulations: None(?)*

Bismuth Tribromophenate (Xeroform; Tribromophenol-bismuth) $Bi_2O_3(C_6H_2Br_3OH)$.
Color and properties: Yellow, odorless powder.
Insoluble in water and alcohol; soluble in dilute hydrochloric acid.
Derivation: By the interaction of bismuth chloride and sodium tribromophenolate.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Medicine (antiseptic; substitute for iodoform).
Railroad shipping regulations: None.*

Bismuth Trichloride. See Bismuth chloride.

Bismuth Trihydrate. See Bismuth hydroxide.

Bismuth Trihydroxide. See Bismuth hydroxide.

Bismuth Triïodide. See Bismuth iodide.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Bismuth Trinitrate. See Bismuth nitrate.

Bismuth Trioxide (Bismuth oxide) Bi_2O_3.
Color and properties: Heavy, yellow powder.
Constants: Sp.gr. 8.8; m.p. 820°C.
Soluble in acids; insoluble in water.
Derivation: Ignition of bismuth nitrate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Bismuth Tritelluride. See Tetradymite.

Bismuth Valeriate $Bi(C_5H_9O_2)_32Bi(OH)_3$.
Color and properties: White powder.
Insoluble in water.
Derivation: Interaction of solutions of bismuth trinitrate and sodium valeriate.
Uses: Medicine (treatment of neuralgia, unofficial).
Railroad shipping regulations: None.*

Bismuthinite (Bismuth glance) Bi_2S_3, may contain Cu or Fe.
Lead-gray mineral, often with yellow tarnish, metallic luster. Contains 81.2% bismuth, 18.8% sulfur.
Soluble in nitric acid.
Constants: Sp.gr. 6.4 to 6.5; hardness 2.
Occurrence: United States (Utah, California), Australia, Bolivia, France, Germany.
Uses: Ore of bismuth.

Bismuthose (Bismuth albuminate).
Color and properties: Pale gray or white powder. Contains 10 to 12% bismuth.
Incompletely soluble in water.
Derivation: By the addition of a solution of 75 parts of dried egg albumin to a solution of 25 parts of bismuth ammonium citrate, evaporating and drying.
Uses: Medicine (astringent and antiseptic; gastric and intestinal cramps, unofficial).
Railroad shipping regulations: None.*

Bismuthyl Chloride. See Bismuth oxychloride.

Bismutite $(BiO)_2CO_3.H_2O$ or $Bi_2O_3CO_2.H_2O$.
White, green or yellow earthy incrustation or powder, dull or vitreous luster, with colorless to greenish streak. Contains about 90% Bi_2O_3. Found in association with metallic bismuth or the sulfide and is an alteration product. Soluble in strong hydrochloric acid.
Constants: Sp.gr. 6.9 to 7.7; hardness 4 to 4.5.
Occurrence: United States (South Carolina, Arizona, California), Bolivia.
Uses: Ore of bismuth.

Bissabol (Perfumed bdellium; Bisabol; Sweet myrrh; Opopona resin).
A gummy, resinous exudation from Commiphora erythrea, var. glabrescens, collected in Somaliland. Resembles Indian bdellium. Should be distinguished from true myrrh.

Bistre. A brown pigment used in water colors. It is made from wood soot.

Bitter Almond. See Amygdala amara.

Bitter Almond Oil. See Almond oil, bitter.

Bitter Almond Oil, Artificial. See Benzaldehyde.

Bitter Almond Oil Camphor. See Benzoin gum, Siam.

Bitter Apple. See Colocynth.

Bitter Ash. See Euonymus or Quassia.

Bitter Cucumber. See Colocynth.

Bitter Damson. See Simaruba bark.

Bitter Gourd. See Colocynth.

Bitter Herb. See Erythraea.

Bitter Root. See Gentian.

Bitter Stick. See Chirata.

Bitter Wintergreen. See Chimaphila.

Bittern. Waste liquors from the salt industry, containing calcium and magnesium sulfates.

Bittersweet. See Dulcamara.

Bitterwood. See Quassia.

Bitumen. A naturally occurring hydrocarbon complex, often associated with a mineral matrix, insoluble in water, but largely soluble in carbon bisulfide, benzene, etc. Its color and hardness are variable. The American Society for Testing Materials uses the term to include all those hydrocarbons which are soluble in carbon bisulfide, whether gases, mobile liquids, viscous liquids, or solids.

Bitumen, Elastic. See Elaterite.

Bitumen, Sulfonated. See Ichthyol,

Bituminites.
United States permissible explosives classified by the United States Bureau of Mines as follows: (See Explosives, permissible for explanation of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
1	C	4
2	A	I a

Railroad shipping regulations: High explosives.

Bituminol. Ammonium sulfobituminolate prepared in Germany as a substitute for ichthyol.

Bituminous Coal (Soft coal). The third stage in the transformation of vegetable matter into coal. In general, the division of bituminous coals from lignites is more clearly defined than that of lignites from peats but the transition, nevertheless, is somewhat gradual.
Uses: Fuel; coke production; manufacture of producer gas, illuminating gas, fuel gas, and briquets.

Biuret (Allophanamide) $C_2H_5N_3O_2.H_2O$.
Color and properties: White needles.
Constants: M.p. 190°C.; b.p.: Decomposes.
Soluble in water and alcohol.
Derivation: From urea by heat.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Bixine. See Annatto.

Black, Aniline. See Aniline black.

Black Antimony. See Antimony sulfide.

Black Ash.
(a) Le Blanc soda process (alkali manufacture). The product obtained by heating sodium sulfate, limestone and coal together.
(b) The soda process in paper manufacture. The product obtained in the soda recovery operation. It contains the sodium carbonate which is recovered from the black ash by leaching. (See Paper pulp).

Black Balsam. See Peru balsam.

Black Boy Gum. See Accroides gum.

Black Caraway. See Nigella sativa.

Black Catechu. See Catechu.

Black Cohosh. See Cimicifuga.

Black Cumin. See Nigella sativa.

Black Diamonds. United States permissible explosives classified by the United States Bureau of

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
2-A	C	4
3-A	C	4
5	A	I a
5, L.F.	A	I a
6, L.F.	C	4
7	A	I a
15	A	1 a
17	A	I a

Railroad shipping regulations: High explosive.

Black Dogwood. See Frangula.

Black Fish Oil (Jaw oil; Malon oil).

Derivation: From the jaws of the blackfish, Globicephalus melas, by extraction with hot water.

Color and properties: A pale, yellow, fixed oil, yielding spermaceti (cetyl palmitate) on standing. The oil obtained from the head and jaw is the finest quality.

Constants: Optical rotation —3° to +5°; saponification value 290; iodine number 32.8.

Soluble in ether, acetone and chloroform.

Grades: Technical.

Containers: Barrels; tins; glass bottles.

Uses: Lubricant for very fine machinery, watches, etc.

Railroad shipping regulations: None.*

Black Haw. See Viburnum prunifolium.

Black Henbane. See Hyoscyamus.

Black Indian Hemp. See Apocynum.

Black Jack. See Sphalerite.

Black Lead. See Graphite.

Black Liquor. See Iron acetate liquor.

Black Mordant. See Iron acetate liquor.

Black Mustard. See Sinapis nigra.

Black Mustard Oil. See Mustard oil.

Black Oils.

Either residues from petroleum or from its distillates. They vary widely in character. The following are the constants of two samples of Pennsylvania black oil: (a) Gr. 23°Bé.; flash point 450°F.; fire test 530°F.; Saybolt viscosity 84 at 212°F. (b) Gr. 26°Bé.; flash point 365°F.; fire test 425°F.; Saybolt viscosity 50 at 212°F.

Railroad shipping regulations: None.*

Black Opal. See Opal.

Black Oxide of Manganese. See Pyrolusite.

Black Pepper Oil. See Pepper oil, black.

Black, Platinum. See Platinum black.

Black Powder. See Gunpowder.

Black Precipitate. See Mercurous oxide, black.

Black Root. See Leptandra.

Black Sampson. See Echinacea.

Black Sea Rape Oil. See Ravison oil.

Black Snake-root. See Cimicifuga.

Blackband. See Siderite.

Blackberry Bark. See Rubus.

Blacks. See various specific blacks below.

Acetylene Black. A carbon black produced by the decompositon of compressed acetylene by electricity, the resulting products being hydrogen and free carbon.

Animal Black (Animal charcoal).

(a) Bone black.
(b) Drop black.
(c) Virgin drop black.
(d) Ivory drop black.

Carbons made by calcination of selected animal bones. Various combinations of the names bone black and drop black are used commercially. Drop blacks are carbons which have been ground and washed (sometimes mixed with a little glue) and cast, while in paste form, into the shape of tears.

(e) Ivory black.

Pure carbon produced by charring ivory shavings, cuttings and dust. Bone black and lampblack are sometimes erroneously referred to as ivory black. Genuine ivory black is not made to any large extent today due to lack of raw material.

Uses: Pigmenting and tinting.

Benzol Black.

A carbon black made from benzene.

Bone Black. See Animal black; also Charcoal, animal.

Carbon Black (Channel black; Gas black).

A fluffy, black pigment produced by burning natural gas with a supply of air insufficient for complete combustion and collecting the liberated carbon on a metal surface by actual contact of the flame on the surface. This process produces from 0.5 lb. to 1.5 lbs. of carbon black from 1,000 cu. ft. of gas or 1.5 to 3.5% of the total carbon in the gas. Although apparently a wasteful process, nevertheless it is the only one in practical operation which produces a product suitable for the two largest uses. It is entirely different from lampblack (q.v.).

Uses: Arranged in order of importance: Printer's ink; automobile tires and rubber goods; black and gray paint and enamel; stove polish; other products (phonograph records, carbon paper, crayons, typewriter ribbons, black and gray paper, glazed paper, tarpaulins, black leather, bookbinders' board, marking and stenciling inks, artificial stone and black tile, Chinese and India inks, pyrotechnics, insulating materials, crucible steel, case hardening).

Channel Black. See Carbon black.

"Columbian" Black.

Trade name for a carbon black.

Containers: 150 lb. cases (12 bags of 12½ lb. each).

"Crow Brand" Black.

Trade name for a carbon black.

"Dixie" Black.

Trade name for a carbon black.

Containers: 150 lb. cases (12 bags of 12½ lb. each).

Drop Black. See Animal black.

"Excelsior" Black.

Trade name for a carbon black.

Containers: 100, 150 lb. cases (12 bags of 12½ lbs. each).

"F. E. Special" Black.

Trade name for a carbon black.

Containers: 100, 150 lb. cases (12 bags of 12½ lb. each).

Frankfort Black. See Vegetable black.

Gas Black. See Carbon black.

German Black. See Vegetable black.

Hypo, Black. A pigment used for imparting a black color to rubber.

Ivory Black. See Animal black.

Ivory Drop Black. See Animal black.

"Kosmos" Black.

Trade name for a carbon black.

Containers: 100, 150 lb. cases (12 bags of 12½ lbs. each).

Lampblack (Germantown black).

A product made by burning solid or semi-solid substances such as rosin and asphaltum compounds, etc., with insufficient air for complete combustion. The most common method, however, is to burn by-products from distillation of coal, petroleum, tar and vegetable oils, or mixtures of any of the above. The smoke from any of these products is deposited in settling chambers and forms the lampblack of commerce. It is entirely different in physical characteristics from carbon black (q.v.). It is gray in contrast to the deep black of carbon black, often contains considerable quantities of empyreumatic matter, and when used in printing ink gives a product with very different properties from an ink made from carbon black.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

"Micronex."

Trade name for a carbon black marketed as follows:

Uncompressed, 150 lb. cases (twelve bags of 12½ lb. each).

Compressed, 225 lb. cases (eighteen bags of 12½ lb. each).

Heavy compressed, 312½ lb. cases (twenty-five bags of 12½ lb. each).

Mineral Black (Slate black).

Black pigments made by grinding black slate, shale, top seam of coal vein, coke, coal and heating waste, and coal dust in retorts (to high temperature). Artificial blacks, of more intense depth of color, are now superseding the mineral blacks.

Paris Black

A bone black.

"Peerless" Black.

Trade name for a carbon black.

Containers: 150 lb. cases (12 bags of 12½ lb. each).

Slate Black. See Mineral black.

"Super-Spectra" Black.

Trade name for a carbon black.

Containers: 100, 150 lb. cases (12 bags of 12½ lbs. each).

"Superba" Black.

Trade name for a carbon black.

Containers: 100, 150 lb. cases (12 bags of 12½ lbs. each).

Toner Black.

Either the extract of ivory black, of bone black, or of certain forms of carbon black, or carbon black upon which nigrosine has been precipitated.

Vegetable Black.

(a) Vegetable charcoal.
(b) Wood charcoal (q.v.).
(c) Vine blacks, Frankfort blacks, German blacks, etc.

These are all formed by incomplete combustion of wood, vegetable matter, sawdust, coconut shells, and various other substances of vegetable origin. Consequently they vary considerably in quality and cost. The superior grades are the Vine and Frankfort blacks obtained by incomplete combustion of grape vines, twigs, husks, and wine lees. The "lees black" is the best and is stated to be suitable for the preparation of the finest blacks.

"Velvetex."

Trade name for a very soft carbon black.

Velvetex-A is recommended, in particular, for mechanical goods, rubber footwear, the side walls of tires and inner tubes. Velvetex-B has a wide range of usefulness in compounds not requiring reinforcement. It is especially recommended in tire frictions and mechanical goods.

Containers: A. 50 lb. jute bags; B. 100 lb. jute bags. Both carload lots.

Vine Black. See Vegetable black.

Virgin Drop Black. See Animal black.

"W. V." Black.

Trade name for a carbon black.

Containers: 150 lb. cases (12 bags of 12½ lb. each).

Blackstrap. See Molasses.

Blackstrap Molasses. See Molasses.

Bladderwack. See Fucus.

Blaes. A name used by the miners to designate the non-bituminous, or less-bituminous, strata found in Scottish oil-shale deposits. They are sometimes of a bluish-gray color. See also "Kingle."

Blanc D'Argent. See White, Cremnitz.

Blanc Fixe (Precipitated barium sulfate; Synthetic or artificial barytes; Artificial heavy spar; Permanent white; Terra ponderosa).

Color and properties: Heavy white powder.

Constants: Sp.gr. 4.476.

Insoluble in water.

Derivation: (1) By treating a solution of a barium salt with sodium sulfate (salt cake). (2) By-product in manufacture of hydrogen peroxide. Barium peroxide is added to a 4% solution of sulfuric acid forming weak hydrogen peroxide and a barium sulfate precipitate. This is washed, dried and marketed as blanc fixe.

Grades: Technical, dry, pulp; U.S.P.; C.P.

Containers: 1, 5 lb. bottles; wooden barrels.

Uses: Used whenever a product of the highest quality of fineness and whiteness is required; pigment for paints; filler for textiles, rubber, linoleum, oilcloth, and lithograph inks; base for lake colors; indicator in X-ray photography.

Railroad shipping regulations: None.*

See also Barytes, the natural product.

Blanching Liquor. A solution of calcium oxychloride.

Blanquette (Salicor; Soude douce). The ash from soda plants found in France.

Blast-furnace Dust. Dust deposited by or recovered from blast-furnace gases. It contains a variable amount of potash which renders it valuable. The black dust is comparatively poor in potash, the reddish dust deposited in the stoves and boilers is richer and the light-colored dust found at the base of the stacks is the richest.

Blast-furnace Gas. A waste gas from blast furnaces used in the metallurgical industry for the production of pig iron. A typical gas will analyze 12.9% carbon dioxide, 26.3% carbon monoxide, 3.7% hydrogen, 57.1% nitrogen. Used for heating blast-furnace stoves and as boiler- or gas-engine fuel.

Blast-furnace Slag. See Slag.

Blast Pig, Cold.

Generally a low-silicon pig iron and so-named because it has been made in a furnace using a cold blast.

Blasting Oil. See Nitroglycerin.

Blasting Powders.

Black, granular, slow-acting explosives which burn with explosive rapidity when ignited under confinement, but do not detonate. They are known, therefore, as deflagrating powders in distinction from high explosives or detonating powders. Blasting powders are divided into two classes: "A" Blasting Powder, composed of potassium nitrate, sulfur, and charcoal, and "B" Blasting Powder, composed of sodium nitrate, sulfur, and charcoal. Blasting powders are made in one strength only, but in a number of standard sizes of granulations. The granulation size is indicated by letters, e.g.,—CC, C, F, FF, FFF, FFFF. CC represents grains about one-half inch in diameter and FFFF those about one-sixteenth inch in diameter. The other letters are intermediate between the two. The smaller granulations burn a little more quickly than the coarser ones and are, therefore, a trifle more shattering in their effect.

Railroad shipping regulations: Explosives.

Blau Gas.

A modification of Pintsch gas (q.v.). In this process the oil is decomposed in retorts and after being purified is compressed to 100 atmospheres, so that the greater portion of it liquefies. A typical gas will analyze 51.9% illuminants, 0.1% carbon monoxide, 2.7% hydrogen, 44.1% methane, 1.2% nitrogen. Candle power 48.2. B.t.u. 1,704.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Industrial heating; domestic illumination and heating.

Railroad shipping regulations: Red gas label.

Blazing Star. See Aletris.

Bleach. See Calcium hypochlorite.

Bleach, Liquid. See Chlorine; also Sodium hypochlorite.

Bleach Liquor. A solution of calcium hypochlorite (q.v.).

Bleaching Powder. See Calcium hypochlorite.

Blend. See Sphalerite.

Blend, Zinc. See Sphalerite.

Blind Coal. A term used in Scotland to designate anthracite.

Blistering Beetle. See Cantharides.

Blistering Fly. See Cantharides.

Block Coal. Bituminous coal with planes meeting at right angles. Block coal is generally woody in texture and contains much mineral charcoal.

Block Tin Lining. Block tin is a common designation for pure tin. For culinary use, copper vessels are frequently lined or coated with tin by the application of molten tin upon clean copper with the aid of fluxing. Such coatings are sometimes called hot dippings. Tin is sometimes used for coating lead sheet or lining lead pipe, and owing to the method of fabrication, these articles may be called two-ply metal. Frequently tin is the metal chosen for making, holding and conveying distilled water and it is used in contact with some chemicals.

Tin linings and coatings are prepared in similar ways to the use of lead with reinforcement. See Lead lining.

Blood Char. See Blood charcoal.

Blood Charcoal (Blood char).

Made by adding caustic potash to blood, evaporating and calcining the residue.

Grades: Fresh; spent.

Uses: (Fresh) decolorizing, deodorizing and filtering.

Railroad shipping regulations: None.*

Blood, Dried.

A packing house by-product produced by coagulating animal blood, followed by drying and grinding. It is a brown powder with an odor similar to that of glue and contains about 11.8% nitrogen and 1.2% phosphorus.

Uses: Fertilizer, also as an ingredient of patent fertilizer compounds; clarifying agent for wines, syrups, etc.; ingredient of patent medicines used for blood diseases; in work on immunity by serum therapy.

Railroad shipping regulations: None.*

Blood Elder. See Ebulus.

Blood Red.

A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Blood-root. See Sanguinaria.

Bloodstone. A variety of chalcedony (q.v.) or quartz (q.v.). Color is dark-green with bright red spots. This term has also been used for hematite (q.v.). It is engraved for signet-ring stones.

Blood Wort. See Erythraea or Ebulus.

Blown Asphalt.

Rubbery bodies obtained by blowing air at high temperature through mineral residual oils. They are also known as "oxidized asphalts," "condensed asphalts," and "mineral rubber" (q.v.). See also Pitches, artificial.

Blown Oils (Oxidized oils; Base oils; Thickened oils; Polymerized oils; Soluble castor oils).

(a) Drying and semi-drying vegetable oils, blubber oils and liquid waxes which have been heated while agitated by a current of air, ozone or oxygen. They are oxidized by this treatment and undergo an increase in density and viscosity approaching that of castor oil. They differ from castor oil in that they are slightly soluble in alcohol but are miscible with mineral oils. These oils are rich in hydroxy acid triglycerides, and are dark colored unless blown cold when they are almost colorless.

(b) See Blown asphalt.

Blubber Oil. See Whale oil.

Blue Black.

Derivation: By distilling beechwood.

Uses: Paint pigment.

Blue Cohosh. See Caulophyllum.

Blue Copperas. See Copper sulfate.

Blue Cross Gas. See Diphenylchloroarsine.

Blue Flag. See Iris versicolor.

Blue Gas. See Water gas.

Blue Ground (Kimberlite). A diamond-bearing rock found in volcanic pipes in South Africa. Essentially it is a hydrated silicate of magnesium.

Blue Gum Tree. See Eucalyptus.

Blue Jack. Nickname given to a Scotch mineral oil.

Blue, Laundry. See Laundry blue.

Blue of Borrel. A dye used in microscopy.

Blue of Manson. A dye used in microscopy.

Blue Oil. An oil obtained in the Scottish shale-oil industry. It is produced from heavy oil and paraffin by cooling and pressing in order to separate the hard paraffin scale. By further processing it is worked up into lubricating oil.

Blue Ointment. One of the ointments containing mercury. It contains not less than 29% and not more than 31% of mercury.

Blue Powder. See Zinc.

Blue Print Paper. Paper dipped in solutions of ammonium ferric citrate and potassium ferricyanide and dried. Sunlight reduces the ferric compound to the ferrous state, forming blue ferrous ferricyanide which is fixed on the paper. Unexposed portions are washed out.

Blue, Prussian. See Iron blues.

Blue Stone. See Copper sulfate.

Blue Verdigris. See Copper acetate, basic.

Blue Verditer. See Bremen blue.

Blue Vitriol. See Copper sulfate.

Blue Vitriol, Natural. See Chalcanthite.

Blue, Washing. See Laundry blue.

Bluestone. The common name for a dark bluish-gray feldspathic sandstone or arkose. The color is due to the presence of fine grains of black and dark-green minerals, chiefly hornblend and chlorite. The rock is extensively quarried in New York, Pennsylvania and New Jersey. Its toughness, due to slight metamorphism, and the ease with which it may be split into thin slabs, especially adapt it for use as flagstone. The term has been locally applied to other rocks, among which are dark-blue slate and blue limestone.

Bodenite. See Allanite.

Body Oil. See Whale oil.

Bog Butter. A substance sometimes found in peat and resembling adipocere (q.v.).

Bog Iron Ore. See Limonite.

Bog Manganese. See Wad.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Bog Moss. See Sphagnum.

Boghead Coal. A cannel coal (q.v.) found at Boghead, Scotland.

Bohemian Earth. See Earths, green.

Boiled Greases. Lime soap dissolved in mineral oil. These greases are satisfactory for lubrication of heavy and medium-sized machinery.

Boiled Oil. See Linseed oil.

Bois de Rose, Femelle. See Linaloe oil.

Bois de Rose, Mâle. See Linaloe oil.

Boldo.
Dried leaf of evergreen shrub, Boldu boldus.
Habitat: Chile.
Chief constituent: Alkaloid, boldine.
Grades: N.F.
Uses: Medicine (fluid extract; veterinary jaundice).

Bole. A variety of red hematite (q.v.) used as a pigment.

Bole, Armenian. See Bole.

Bole, Red. See Bole.

Bolley's Green. A dehydrated copper borate used as an oil color.

Bolognian Phosphorus. See Phosphorus, Bolognian.

Bolt Oil. A viscous neutral oil recommended for lubricating bolt and nut threads.
Constants: Sp.gr. 30°Bé.; Saybolt viscosity, 220.

Bolus Alba. See Kaolin.

Bond Clay. See under Clays.

Bone Ash (Bone earth).
An ash containing from 67 to 85% basic calcium phosphate, 2 to 3% magnesium phosphate, 3 to 10% calcium carbonate, some caustic lime and calcium fluoride.
Derivation: By calcining bones.
Uses: Manure; in the preparation of superphosphates; cleaning and polishing compounds.

Bone Black. See under Blacks, Animal black.

Bone Brown. Partially charred ivory dust. Used as a pigment.

Bone Char. See under Blacks, Animal black.

Bone Charcoal. See under Blacks, Animal black.

Bone, Dissolved. A ground bone or bone meal which has been treated with sulfuric acid. Used as fertilizer material.

Bone Earth. See Bone ash.

Bone Fat (Bone tallow).
Fat obtained from animal bones by any of the following methods: (a) By boiling fresh bones in water. (b) By treating with steam under pressure. (c) By extraction with an organic solvent.
Uses: Manufacture of candles and cheap soaps.

Bone Fat Pitch. See Stearin and fatty acid pitches.

Bone, Fine. The trade terms "bone meal," "bone dust," and "fine bone" are used to indicate mechanical condition, or fineness of division, and do not refer especially to composition.

Bone Glue. See Glue and gelatin.

Bone Meal, Raw.
A meal produced by drying and grinding animal bones not previously steamed under pressure. Contains 4 to 5% ammonia, 20 to 25% phosphoric acid, 43 to 55% bone phosphate. Used as fertilizer.

Bone Meal, Steamed. A meal produced by grinding animal bones which have been previously steamed under pressure. Contains 2 to 3% ammonia, 50 to 55% bone phosphate. Used as fertilizer.

Bone Oil (Animal oil; Dippel's oil; Hartshorn oil; Jeppel's oil).
Color and properties: Brown, liquid, fixed oil; repulsive odor.
Chief constituents: Hydrocarbons, pyridine bases, amines.
Constants: Sp.gr. 0.900 to 0.980.
Soluble in water.
Derivation: By the destructive distillation of bones or other animal substance. After extraction with benzene or carbon bisulfide, they are distilled in iron or clay retorts, the volatile products, consisting of gaseous ammonium salts and bone oil, are condensed and the gases containing the ammonium compounds collected in sulfuric acid. The bone oil and aqueous liquor collected are separated by gravity. The crude bone oil is subjected to fractional distillation. The constituents are numerous, the most important being pyridine.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; tank cars.
Uses: Organic preparations; insectifuge; source of pyrrole.
Railroad shipping regulations: None.*

Bone Phosphate. Phosphoric acid is found in bones in the form of tribasic calcium phosphate (q.v.).

Bone Phosphate of Lime. See Bone phosphate.

Bone, Precipitated.
A by-product from the manufacture of glue. It may contain as high as 40% phosphoric acid. Physically, it is very fine and dry. Chemically, it is ranked as available although its action is not so rapid as that of phosphates which are chemically treated to increase activity.

Bone Superphosphate. A fertilizer prepared from bones. It contains all the phosphoric acid in a water-soluble form.

Bone Tallow. See Bone fat.

Boneset. See Eupatorium.

Bony Coal. One which, after burning, leaves considerable residue.

Boort. See Diamond.

Boracic Acid. See Boric acid.

Boracite $6MgO.MgCl_2.8B_2O_3$.
A natural chloride and borate of magnesium. Found in deposits of halite, gypsum and anhydrite. Occurs either as small hard crystals which are strongly pyroelectric or as snow-white rather soft masses. The latter variety usually referred to as stassfurtite.
Constants: Sp.gr. 2.9 to 3; hardness 7 (crystals).
Occurrence: Germany.

Borage (Burrage; Bee bread; Starflower).
Derivation: The flowers and leaves of Borago officinalis; habitat: Levant; cultivated in United States and Germany.
Grades: Technical.
Containers: Boxes; burlap bags.
Uses: Food; medicine.
Railroad shipping regulations: None.*

Boral. Borotartrate of aluminum.
Color and properties: Sweet, astringent taste.
Soluble in water, but generally used in the powdered form.
Uses: Medicine (local astringent in nose and throat affections).
Railroad shipping regulations: None.*

Borax (Tincal; Tinkal) $Na_2B_4O_7.10H_2O$.
A natural sodium borate or borax found on the shores of Tibetan salt lakes and in the marshes of shallow lakes in California, Nevada and Oregon.
Color and properties: White, gray, bluish- or greenish-white streak; vitreous or dull luster.
Constants: Sp.gr. 1.69 to 1.72; hardness 2 to 2.5.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: As raw material for the manufacture of commercial borax, now largely displaced in the United States by colemanite (q.v.).
Railroad shipping regulations: None.*
See also Sodium borate.

Borax, Burnt (Borax, calcined; Borax usta).
A porous, spongy mass produced by calcining sodium borate (q.v.) until it loses most of its water of crystallization.
Railroad shipping regulations: None.*

Borax, Calcined. See Borax, burnt.

Borax Glass. See Sodium borate, fused.

Borax Usta. See Borax, burnt.

Borcher's Metal. An alloy analyzing 64.6% nickel, 32.3% chromium, 1.8% molybdenum and 0.5% silver.

Bordeaux Mixture.
A liquid insecticide made by adding slaked lime to a copper sulfate solution. It is either made by the user or bought as a powder ready for dissolving.
Soda Bordeaux mixture is made by dissolving 6 lbs. copper sulfate and 2 lbs. caustic soda in 50 gallons of water.
Railroad shipping regulations: None.*

Bordow. Proprietary name for Bordeaux mixture. Stated to be an exceptionally fine, light powder containing 12.75% metallic copper.
Containers: 54 lb. cases (40 1 lb. cans); 52 lb. cases (12 4 lb. bags); 112 lb. drums.
Uses: Insecticide for fruit, potatoes, vegetable and shrubs.
Railroad shipping regulations: None.*

Boric Acid (Boracic acid; Ortho-boric acid) H_3BO_3.
Color and properties: White crystals or powder.
Constants: Sp.gr. 1.4347; m.p. 184°C.
Soluble in water and in alcohol.
Derivation: (a) By adding hydrochloric or sulfuric acid to a solution of borax and crystallizing. (b) Decomposing boracite with hydrochloric acid. (c) Found native in Tuscany.
Method of purification: Recrystallization.
Grades: U.S.P.; C.P.; technical: crystals, powder, impalpable powder.
Containers: Crystals, powder: 100 lb. bags; 100 lb. kegs; 300 lb. barrels. Impalpable powder: 100 lb. kegs; 175, 300 lb. barrels. All types: 1 lb. cartons; 5, 25, 50 lb. boxes.
Uses: Chemicals (borates, water-glass manufacture, nitric acid from saltpeter with simultaneous production of borax); ceramic glazes; high grade cements capable of taking high polishes; impregnating wicks of stearin candles; food preservative; glass pastes and special glasses; intermediates; laundry starch glazes; leather (preparation of hides prior to tanning, leather-dressing compounds); artificial precious stones; metallurgy (welding flux, brazing copper, enameled coatings on iron); fireproofing compositions and linings for safes; pigments (Guignet's green, borated ultramarine); enamel paints; manufacture of imitation hard wood from soft wood; paper glazes; medicine (detergent wash for mucous membranes; internal antiseptic); cosmetics; soaps, textiles (fireproofing, mordant, solvent bleach); wine making (preservative).
Railroad shipping regulations: None.*

Boric Acid, Ortho-. See Boric acid.

Borneene. A volatile and inflammable, oily liquid hydrocarbon.

Borneo Camphor. See Borneol.

Borneo Tallow (Green butter). Term used to denote a large variety of fats obtained from the fruit of the family of Dipterocarpus. Minjak tangkawang (tangkawang fat) is a mixture of fats from six varieties of trees.
Uses: Manufacture of candles; substitute for cacao butter.

Borneol (Borneo camphor; Bornyl alcohol; Sumatra camphor; Malayan camphor; Baras camphor) $C_{10}H_{17}OH$.
Color and properties: White, translucent lumps; peculiar camphor-like odor; burning taste.
Constants: Sp.gr. 1.011; m.p. 208°C.; b.p. 212°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: (a) By reduction of ordinary camphor with nascent hydrogen. (b) From the wood of Dryobalanops camphora, a tree found in Sumatra and Borneo—deposited in the trunks in solid crystalline mass. (c) A constituent of certain volatile oils including citronella, thyme, African ginger, Canada snake root, nutmeg.
Grades: Technical.
Containers: 1, 5 lb. tins; 5, 25 lb. boxes; 100 lb. kegs.
Uses: Medicine (sedatives); manufacture of synthetic camphor; perfumery; chemical esters; celluloid.
Railroad shipping regulations: None.*

Borneol Salicylate. See Salit.

Bornite (Purple copper ore; Horse flesh ore; Erubescite; Peacock copper ore) Cu_5FeS_4.
Dark copper-red, brownish or violet-blue mineral, metallic luster. Grayish-black streak. On fresh fracture is of a peculiar red-brown color, but tarnishes to deep blue and purple tints. Contains 63.3% copper, 11.1% iron, 25.6% sulfur, but may vary from 50 to 70% copper and 15 to 16.5% iron due to admixture of chalcocite.
Often a primary mineral found in igneous rocks. Also a secondary mineral in the enriched portions of copper sulfide veins. Is usually associated with other copper ores.
Soluble in nitric acid.
Constants: Sp.gr. 4.9 to 5.4; hardness 3.
Occurrence: United States (Connecticut, Pennsylvania, Idaho, Montana), Canada, England, Ireland, Italy, Germany, Sweden, Siberia, Hungary, Chile, Peru, Bolivia, Mexico.
Uses: Source of copper.

Bornyl Alcohol. See Borneol.

Bornylbromovalerate. See Brovalol.

Bornyldibromodihydrocinnamate. See Adamon.

Bornylisovaleriate. See Bornyval.

Bornylisovalerylglycollate. See Neobornyval.

Borynval (Bornylisovaleriate) $C_{10}H_{17}OC_5H_9O$.
Color and properties: Limpid fluid, aromatic, valerian-like odor.
Constants: Sp.gr. 0.951 at 20°C.; b.p. 255° to 260°C.
Soluble in alcohol and ether; insoluble in water.
Uses: Medicine (sedative, nervous headache, neurasthenia, dysmenorrhea, epilepsy, sexual disturbances, unofficial).
Railroad shipping regulations: None.*

Boroglycerides (Glycercylborates).
A combination of boric acid and glycerol, used as a convenient form of obtaining boric acid in a soluble condition. The calcium and sodium salts are commonly used.
Railroad shipping regulations: None.*

Borolon. A proprietary name for an aluminum oxide refractory.
Color and properties: White to dark wine-colored, very tough and dense crystalline masses of artificial aluminum oxide.
Constants: Sp.gr. 3.9 to 4.0.
Derivation: Prepared by fusion of bauxite in an electric furnace.
Grades: Grains, from 8 mesh to finest powders.
Containers: Kegs.
Uses: Chemical apparatus; abrasives; refractories; grinding wheels; filters.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Boron B.
Color and properties: Very soft, brown, amorphous powder; ignites in air.
Constants: Sp.gr. 2.45.
Soluble in concentrated nitric and sulfuric acids; insoluble in water, alcohol and ether.
Derivation: By heating boric oxide with powdered magnesium.
Grades: Technical.
Containers: Iron drums.
Uses: Catalytic agent; ceramics; metallurgy (alloy steels, cementation of iron); thermometers and thermo regulators.
Railroad shipping regulations: None.*

Boronatrocalcite. See Ulexite.

Boronia Oil.
Color and properties: Dark green oil, odor of lemon, orange and rose.
Derivation: From flowers and leaves of boronia.
Uses: Perfumery.

Boronotungstic Acid. See Borotungstic acid.

Borophenylic Acid.
$(C_6H_5BO_2)+(C_6H_5B_3O_5)$.
Color and properties: White or reddish crystals. A mixture of phenyl borate and phenyltriborate.
Constants: M.p. 204°C.
Soluble in water and alcohol.
Derivation: By the action of phosphorus oxychloride on a mixture of boric acid and phenol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine; antiseptic.
Railroad shipping regulations: None.*

Borotungstic Acid (Borowolframic acid; Boronotungstic acid) $B_2O_3(WO_3)_9.24H_2O$.
Color and properties: Yellowish liquid.
Constants: Sp.gr. 3.0.
Soluble in water.
Derivation: By heating ammonium borotungstate with aqua regia.
Grades: Technical.
Containers: Glass bottles.
Uses: Mineralogic assays.
Railroad shipping regulations: None.*

Borovertin (Hexamethylenetetramine triborate) $(CH_2)_6N_4.3HBO_2$.
Color and properties: White powder.
Soluble in water; almost insoluble in alcohol and ether.
Derivation: Interaction of formin and boric acid.
Uses: Medicine (urinary antiseptic, unofficial).
Railroad shipping regulations: None.*

Borowolframic Acid. See Borotungstic acid.

Bort. See Diamond.

Botany Bay Kino.
Color and properties: Irregular dark red pieces.
Derivation: Inspissated juice of Eucalyptus calophylla R. Brown and some other Australian species of eucalyptus.
Uses: Similar to Eucalyptus kino (q.v.).

Bottle-nose Oil. A cheap grade of olive oil used in soap-making.

Bottle-rush. See Equisetum.

Boulangerite $3PbS.Sb_2S_3$.
Lead-gray secondary mineral, often covered with yellow spots due to oxidation, formed in lead and antimony veins.
Constants: Sp.gr. 5.3 to 6.5; hardness 2.5 to 3.5.
Occurrence: United States (Nevada), Italy.

Boules de Nancy. See Iron-potassium tartrate.

Bournonite $PbCuSbS_3$.
Steel-gray to nearly black secondary mineral of metallic luster. Contains 42.5% lead, 24.7% antimony, 13.0% copper, balance sulfur. Soluble in nitric acid.
Constants: Sp.gr. 5.7 to 5.9; hardness 2.5 to 3.
Occurrence: United States (Arizona), Hungary, England.

Bovey Coal. A variety of brown coal, chiefly a compound of wood and bitumen.

Bowenite. See Serpentine.

Box Oil. An oil obtained from boxwood.

Boxberry. See Gaultheria.

Boyle's Fuming Liquor. A yellow liquid prepared by distilling ammonium chloride with lime and sulfur.

Bragite. See Fergusonite.

Bran. The coarse, husky outer-coat of wheat, rye, and other cereals, which, after grinding, is separated from the flour by sifting or bolting.

Bran Oil. See Furfural.

Brandy Mint. See Peppermint.

Brasilin (Brazilin).
The crystalline colorizing principle of Brazilwood.

Brass and Bronze.
Brass:
A copper-zinc alloy of varying composition. It also usually contains some lead or tin (sometimes both) and small percentages of other metals.
Bronze:
A copper-tin alloy of varying composition. It also usually contains some zinc or lead (sometimes both) and small percentages of other metals.
Note: Aluminum brasses and bronzes also find considerable commercial application.
See also: Admiralty, Aluminum bronze, Commercial bronze, Hardware bronze, Hytensl bronze, Phosphor bronze 30, Phosphor bronze 47, Phosphor bronze 209, Red brass, Resistac.

Brassil. See Iron pyrites.

Braunite $3Mn_2O_3.MnSiO_3$ or $4Mn_2O_3.MnSiO_3$.
Brownish-black to steel-gray mineral, streak same color. Submetallic luster. Contains 78.3% manganese sesquioxide, 11.7% manganese protoxide, 10.0% silica. Some replacement of the manganese by small amounts of iron, calcium, barium.
Constants: Sp.gr. 4.75 to 4.82; hardness 6 to 6.5.
Occurrence: United States (Arkansas), Germany, Italy, Elba, Norway, Sweden.
Uses: Ore of manganese.

Brayera. See Kousso.

Brazil-nut Oil. See Castanha oil.

Brazil Wax. See Carnauba wax.

Brazil-wood. Redwood of commerce (Cesalpinia brasiliensis).

Brazil-wood, Yellow. See Morus tinctoria.

Brazilian Cacao. See Guarana.

Brazilian Pebbles. A form of native silica or quartz (q.v.). See also Rock, crystal. Formerly used for optical lenses.

Brea. Sand or soil impregnated with petroleum from seepages, the volatile constituents having evaporated. Used as road dressing.

Brea Gum. Substitute for acacia, derived from a Brazilian tree, Cesalpinia precox. Contains 77% arabin.

Breecht's Double Salt (Potassium bimagnesium sulfate). A double salt produced in the treatment of kainit (q.v.) at Stassfurt, Germany. Used as fertilizer.

Bremen Blue (Blue verditer; Copper blue).
Greenish-blue pigment consisting chiefly of copper hydroxide together with some carbonate and oxychloride. These blues are opaque in water, become slightly transparent in oil and lose body. They are soluble in acids and ammonia and are darkened by hydrogen sulfide or sulfur fumes.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Breunnerite. See Magnesite.

Brick, Alumina (Aluminous; High alumina).
Refractory bricks of higher alumina content than ordinary fire-clay brick. They are made from several alumina materials, such as diaspore (q.v.), bauxite (q.v.), kaolin (q.v.), gibbsite (q.v.), etc. See also refractories.

Typical properties of bauxite brick:

Refractoriness	Cone 36-39
Ret. U-load, 50 lb. per sq. in.	Cone 14
True specific gravity	3.1-3.4
Apparent specific gravity	1.8-2.1
Porosity (per cent)	30-40
Coefficient thermal expansion (0°-1,000°C.)	65×10^{-7}

Analysis of one bauxite brick:

	Per Cent
Silica	8.82
Iron oxides (Fe_2O_3)	6.30
Alumina	78.01
Lime	0.98
Magnesia	4.41
Titania	1.16

Uses: The use of high alumina brick has become increasingly general in the last few years under certain types of operating conditions where the service is severe. A large use of brick of this type is in the hot zone portion of rotary lime, cement or dolomite kilns as well as in the firing zone of shaft lime kilns. High alumina brick are also used in certain portions of large boiler settings and in ceramic kilns of both the continuous and the periodic types; in brief, they find application under certain types of conditions where the service is very severe.

Brick, Bauxite. See Brick, alumina.

Brick, Chrome.
Refractory bricks made from chrome ores. They contain about 35 to 44% Cr_2O_3. See also refractories.

Typical properties:

Refractoriness	Cone 40-42
Ret. U-load, 50 lb. per sq. in.	Cone 15
True specific gravity	3.1-3.6
Apparent specific gravity	2.3-2.6
Porosity (per cent)	20-30
Coefficient thermal expansion (0°-1,000°C.)	90×10^{-7}

Uses: Chrome brick are used to some extent in place of magnesia brick because they are somewhat less expensive. They are also used as a dividing material to separate refractories of opposite chemical character; for example, in the open-hearth furnace, frequently a course or two of chrome brick is used to separate the silica roof from the magnesia sidewalls, thereby preventing chemical interaction.

Brick, Fire-.
The term "fire-brick" is sometimes used to refer to any refractory brick. Its use should more properly be limited to those brick manufactured essentially from refractory fire-clays, and containing up to about 48 to 50% alumina.

Analysis of one low-grade fire-clay brick: Silica 61 to 72%, iron oxide (Fe_2O_3) 6.43%, alumina 28.70%, lime 0.46%, magnesia 1.04%, soda 0.05%, potash 0.05%, titania 1.60%.

Analysis of one high-grade fire-clay brick: Silica 53.52%, iron oxide (Fe_2O_3) 2.00%, alumina 41.00%, lime 0.30%, magnesia 0.30%, soda 0.90%, potash 0.20%, titania 1.60%.

Typical properties:

Refractoriness	Cone 30-35
Ret. U-load 50 lb. per sq. in.	Cone 14-20
True specific gravity	2.5-2.6
Apparent specific gravity	1.9-2.1
Porosity (per cent)	20-30
Coefficient thermal expansion (0°-1,000°C.)	40×10^{-7}

See also Refractories.

Uses: Restricting the term to fire-clay brick: Entire linings of iron blast furnaces; linings and checkers of blast-furnace stoves. Checker work in other operations as in open-hearth furnaces, glass tanks, etc. Large quantities are used in connection with power plants and industrial boiler stations, cupolas, malleable furnaces, heating furnaces of various kinds, gas producers, water gas sets. A large portion of the lining of rotary cement and lime kilns as well as cement coolers is also built of fire-brick.

Brick, High Alumina. See Brick, alumina.

Brick, Magnesia. Magnesite brick.
Refractory bricks consisting essentially of MgO, with about 15% of other oxides. See also refractories.

Typical properties:

Refractoriness	Cone 39-40
Ret. U-load 50 lb. per sq. in.	Cone 16
True specific gravity	3.1-3.5
Apparent specific gravity	2.4-2.7
Porosity (per cent)	20-30
Coefficient thermal expansion (0°-1,000°C.)	100×10^{-7}

Uses: Magnesia brick are used wherever the corrosion of basic slags is severe, as in the bottoms of open-hearth steel furnaces, of copper reverberatory furnaces, in soaking pits and in the basic electric steel furnace. Certain factors tend to reduce their application, including higher cost, comparatively lower mechanical strength at elevated temperatures and greater thermal expansion.

Brick, Magnesite. See Brick, Magnesia.

Brick Oil.
One typical brick oil has the following characteristics:

Color and properties: Pale, non-viscous neutral oil.

Constants: Gr. 34° Bé; flash point 340°F.; fire test 400°F.; cold test 20°F.; Saybolt viscosity 80.

Railroad shipping regulations: None.*

Brick, Silica.
Refractory bricks consisting essentially of lime-bonded quartzite (q.v.). The best American brands contain approximately 94 to 96% SiO_2 with about 2% CaO. See also refractories.

Typical properties:

Refractoriness	Cone 32-35
Ret. U-load 50 lb. per sq. in.	Cone 18-30
True specific gravity	2.3-2.5
Apparent specific gravity	1.7-1.9
Porosity (per cent)	20-30
Coefficient thermal expansion	†

† Practical users of silica brick give their expansion as being 3/16 to 1/4 inch (1.6 to 2.1%) per foot. Most of this occurs below 600°C. A sudden acceleration in expansion takes place at about 575°C.

Analysis of one brick: Silica 96.42%, iron oxides (Fe_2O_3) 0.50%, alumina 0.75%, lime 2.01%, magnesia, 0.08%, titania 0.06%.

Uses: Because of their excellent mechanical strength at high temperature, their positive expansion at high heat and the fact that they do not begin to deform except at temperatures within a very few degrees of their actual fusion point, silica brick are extensively used for arch work wherever operation is steady. Thus silica brick are used in the open-hearth roof, in the caps of glass tanks and in the crowns of copper reverberatory furnaces. Silica brick are also used in the by-product coke oven because of their higher thermal conductivity as compared with fire-clay brick and their resistance to abrasion; the same factors make them suited for coal-gas retorts. The roofs of electric steel furnaces are usually of silica material.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Brick, Zirconia.
Refractory bricks containing a high percentage of zirconium oxide.
Typical properties:

Refractoriness	Cone 39-42
Ret. U-load 50 lb. per sq. in.	Cone 19
True specific gravity	4.8-5.9
Apparent specific gravity	4.0-4.6
Porosity (per cent)	15-30
Coefficient thermal expansion (0°-1,000°C.)	8.4×10^{-7}

Uses: In metallurgical furnaces to resist basic slag.

Brilliant Croceine. Organic dye of the azo group.

Brimstone. See Sulfur.

Brimstone Acid. A sulfuric acid (q.v.) prepared from sulfur. It is free from arsenic and iron.

Brindisite. See Seybertite.

Bristol Diamonds. See Rock, crystal.

British Gum. See Dextrin.

Brittle Silver Ore. See Stephanite.

Brochantite (Native basic copper sulfate) $CuSO_4 . 3Cu(OH)_2$.
Velvety, emerald- or blackish-green mineral, vitreous luster, pale green streak. A minor ore found occasionally in oxidized zones. Contains 70.3% cupric oxide, 17.7% sulfur trioxide, balance water. Soluble in acids.
Constants: Sp.gr. 3.9; hardness 3.5 to 4.
Occurrence: United States (Colorado, Utah, Arizona), Siberia, England, Hungary, Iceland, Mexico, Chile.

Broenner's Acid. See 2-Naphthylamine-6-sulfonic acid.

Bröggerite. A crystallized variety of uraninite (q.v.). Sp.gr. 9.03.

Bromal. See Tribromacetaldehyde.

Bromalbacid (Albumin bromate; Brominated albumin). Brominated egg albumin. Contains 6% bromine. Soluble in water.
Uses: Medicine (sedative, unofficial).

Bromalin. See Hexamethylenetetramine bromoethylate.

Bromargyrite (Bromyrite) AgBr.
One of the cerargyrite or natural silver haloid (q.v.) group. Bright yellow to grass-green, olive green, greenish-gray in color. Contains 57.4% silver.
Constants: Sp.gr. 5.8 to 6; hardness 2 to 3.
Occurrence: United States (Nevada, New Mexico), Mexico, Chile, France.

Bromated Camphor. See Camphor bromate.

Bromauric Acid $HAuBr_4 5H_2O$.
Color and properties: Dark, red-brown needle crystals or granular masses; odorless; metallic and acid taste. Stable in air if pure but deliquescent if chloride is present.
Constants: M.p. 27°C.
Soluble in water and alcohol.
Derivation: By dissolving auric bromide in hydrobromic acid, concentrating and crystallizing.
Grades: N.F.
Containers: Bottles.
Uses: Medicine (diabetes).
Railroad shipping regulations: None.*

Bromcamphor. See Camphor bromate.

Bromelia. See Naphthylethyl ether, beta-.

Bromeosin. See Eosin.

Bromethylformin. See Hexamethylenetetramine bromethylate.

Brometone. See Tribromo-tertiary-butyl alcohol.

Bromic Acid $HBrO_3$.
Color and properties: Colorless or slightly yellow liquid; turns yellow on exposure.
Constants: Sp.gr. 3.1883; m.p.: Decomposes at 100°C.
Soluble in water.
Derivation: Sulfuric acid is added to a solution of barium bromate and the product recovered by subsequent distillation and absorption in water.
Grades: Technical (Sp.gr. 1.12=15.5°Bé.).
Containers: Glass bottles; carboys.
Uses: Dyes; intermediates; pharmaceuticals.
Railroad shipping regulations: White label.

Bromic Ether. See Ethyl bromide.

Brominated Albumin. See Bromalbacid.

Brominated Camphor. See Camphor bromate.

Brominated Glidin. See Bromoglidin.

Brominated Lecithin. See Bromolecithin.

Brominated Lime. A bleaching agent prepared by treating lime with bromine.

Brominated Methylethyl Ketone (Bromoketone) $CH_2BrCOC_2H_5$ or $CH_3COCHBrCH_3$. A military poison gas used in the late war.

Brominated Poppyseed Oil. See Lipobromol.

Brominated Tannin Gelatin. See Bromocoll.

Bromine Br.
Color and properties: Very dark, reddish-brown liquid; irritating fumes; burns skin.
Constants: Sp.gr. 3.1883; m.p. 7.3°C.; b.p. 58.7°C.
Soluble in alcohol, ether, chloroform, carbon bisulfide, potassium bromide; slightly soluble in water.
Derivation: By direct electrolysis from waste brine of the salt industry.
Method of purification: Distillation.
Grades: Technical; N.F.; C.P.; U.S.P.
Containers: 1, 6½ lb. glass bottles; earthenware bottles.
Uses: Chemicals (bromides, hydrobromic acid, general oxidizing agent); intermediates; dyes; analytical reagent; inks; galvanic batteries (depolarizer); leather; metallurgy (removal of silver in platinum refining, cyanide gold extraction process); military gas manufacture; in admixture with diatomaceous earth as a solid disinfectant; disinfecting rooms and buildings; pharmaceuticals.
Fire hazard: May produce fire on contact with organic matter such as sawdust, excelsior, etc. Fumes or vapors are poisonous!
Railroad shipping regulations: White label.

Bromine Iodide. See Iodine bromide.

Bromine Water. A solution of 3.2 grams of bromine in 100 grams of water.

Brominol. See Bromipin.

Bromipin (Brominol).
A yellow oily liquid, a bromine addition product of sesamé oil containing about 10% of bromine in organic combination. Used in medicine (unofficial) as a substitute for inorganic bromides.

Bromoacetic Acid $CH_2BrCOOH$.
Color and properties: Colorless, deliquescent crystals. Keep from air and moisture.
Constants: M.p. 51°C.; b.p. 208°C.
Soluble in water, alcohol and ether.
Derivation: By heating acetic acid and bromine.
Method of purification: Crystallization from alcohol.
Grades: Technical.
Containers: Barrels; tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Bromoacetone $CH_2BrCOCH_3$. A military poison gas used in the late war.

Bromoanthracene, Alpha-. See Dibromoanthracene.

Bromobenzene (Bromobenzol) C_6H_5Br.
Color and properties: Colorless, oily liquid.
Constants: Sp.gr. 1.49528; m.p. —30.6°C.; b.p. 156.15°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: By bromination of benzene in presence of iron.
Method of purification: Washing with caustic soda, followed by steam distillation.
Grades: Technical; pure.
Containers: 100, 600, 1,200 lb. drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Bromobenzoic Acid, Para-. $C_6H_4BrCOOH$.
Color and properties: Colorless or reddish crystals.
Constants: M.p. 254°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: From para-bromotoluene by oxidation.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Bromobenzyl Cyanide, Ortho-. (Ortho-bromo-2-phenylacetonitrile) $C_6H_4CH_2CNBr$. A military poison gas used in the late war.

Bromobutol. See Tribromo-tertiary-butyl alcohol.

Bromobutyric Acid, Alpha-. $CH_3CH_2CHBrCOOH$.
Color and properties: Clear, colorless, oily liquid.
Constants: Sp.gr. 1.54; b.p. 214° to 217°C.
Soluble in alcohol and ether.
Derivation: By heating bromine and butyric acid.
Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Bromocamphor. See Camphor bromate.

Bromocarnallite.
An artificial carnallite (q.v.) in which chlorine is replaced by bromine.

Bromochinal. See Bromoquinal.

Bromocoll (Dibromotannin-gelatin; Brominated tannin gelatin).
Color and properties: Yellow powder; odorless; tasteless; contains 20% bromine, 40% tannic acid, 30% gelatin; gives only mild bromism symptoms.
Uses: Medicine (sedative, unofficial).
Railroad shipping regulations: None.*

Bromodiethylacetylurea (Adalin; Carbromalum) $C(C_2H_5)_2BrCONHCONH_2$.
Color and properties: White, crystalline powder, odorless, tasteless.
Constants: M.p. 116° to 117°C.
Soluble in chloroform, ether, alcohol, concentrated mineral acids and alkali hydroxide solutions; almost insoluble in water.
Derivation: Interaction between bromodiethylacetyl bromide and urea.
Uses: Medicine (sedative in neurasthenia, hysteria, epilepsy, whooping-cough. Analgesic in neuralgia and other pains).
Railroad shipping regulations: None.*

Bromoethane. See Ethyl bromide.

Bromoform (Formyl tribromide; Tribromomethane; Methenyl tribromide) $CHBr_3$.
Color and properties: Colorless, heavy liquid; odor and taste similar to those of chloroform.
Constants: Sp.gr. 2.8887; m.p. 9°C.; b.p. 151.2°C.
Soluble in alcohol, ether, chloroform, benzene, benzine, fixed and volatile oils; slightly soluble in water.
Derivation: By heating acetone or ethyl alcohol with bromine and alkali hydroxide, and recovery by distillation. (Similar to acetone process for chloroform).
Method of purification: Redistillation.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; bottles in 50 lb. cases.
Uses: Medicine (remedy for whooping cough); organic preparations.
Railroad shipping regulations: None.*

Bromoglidin (Brominated glidin).
Color and properties: Brownish powder, odorless, tasteless.
Sparingly soluble in water.
Uses: Medicine (sedative, unofficial).

Boromisovaleryl-para-phenetidine, Alpha-. See Phenoval.

Bromoisovaleryl Urea (Bromural) $(CH_3)_2CHCHBrCONHCONH_2$.
Color and properties: White needles, slightly bitter in taste.
Constants: M.p. 147° to 149°C.
Soluble in hot water, alcohol and ether.
Uses: Medicine (nerve sedative).
Railroad shipping regulations: None.*

Bromoketone. See Brominated methylethyl ketone.

Bromol (Tribromophenol) $C_6H_2Br_3OH$.
Color and properties: Soft, white needles; sweet taste, disagreeable penetrating bromine odor.
Constants: M.p. 95°C., sublimes undecomposed above 95°C.
Soluble in alcohol, chloroform, ether and caustic alkaline solutions; almost insoluble in water.
Uses: Medicine (surgical antiseptic, gangrene, tuberculous ulcers, intestinal disinfectant, olive oil solution in diphtheria, unofficial).
Railroad shipping regulations: None.*

Bromolecithin. Brominated lecithin. Contains approximately 30% of bromine. Used in medicine as a sedative, unofficial.

Bromolein.
A clear yellow, oily liquid consisting of brominated, unsaturated fatty acids of almond oil.
Contains 20% bromine.
Uses: Medicine (sedative, unofficial).
Railroad shipping regulations: None.*

Bromomethane. See Methyl bromide.

Bromonaphthalene, Alpha- $C_{10}H_7Br$.
Color and properties: Yellow crystals.
Constants: Sp.gr. 1.4870; m.p. 6.2°C.; b.p. 279°C.
Soluble in water, alcohol and ether.
Derivation: By the bromination of naphthalene.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Dyes.
Railroad shipping regulations: None.*

Bromophenol (Phenolbromate) C_6H_4BrOH.
Color and properties: Dark yellow, oily, strong-smelling fluid.
Soluble in alcohol and ether; slightly in water.
Derivation: Combination of bromine and phenol at 150° to 180°C.
Uses: Medicine (erysipelas); disinfectant.
Railroad shipping regulations: None.*

Bromo-2-phenylacetonitrile, Ortho-. See Bromobenzyl cyanide, ortho-.

Bromopropionic Acid $CH_3CHBrCOOH$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 1.69; m.p. 24.5°C.; b.p. 203°C.
Soluble in water, alcohol and ether.
Derivation: By heating propionic acid with bromine.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Bromoquinal (Bromochinal; Quinine dibromosalicylic acid) $C_{20}H_{24}O_2N_2(C_6H_2Br_2OHCOOH)_2$
Color and properties: Yellow crystals.
Sparingly soluble in water, alcohol and ether.
Uses: Medicine (antipyretic, soporific, unofficial).
Railroad shipping regulations: None.*

Bromosuccinic Acid $C_2H_3Br(COOH)_2$.
Color and properties: Colorless crystals.
Constants: M.p. 159° to 160°C.
Soluble in water.
Derivation: By heating bromine and succinic acid.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden casks.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Bromotan (Bromotannin-methylene urea).
Color and properties: Light brown powder, odorless, tasteless.
Insoluble in water.
Uses: Medicine (dusting powder in eczema, unofficial).
Railroad shipping regulations: None.*

Bromotannin Methylene Urea. See Bromotan.

Bromural. See Bromoisovaleryl urea.

Bromyrite. See Bromargyrite.

Brongniardite. A natural lead-silver sulfantimonide, $PbAg_2Sb_2S_5$. Contains 26.2% silver. Found in Arizona.

Bronner's Acid. See 2-Napthylamine-6-sulfonic acid.

Bronze. See Brass and bronze.

Bronze, Commercial. A non-ferrous alloy containing 90% copper and 10% zinc. It offers good resistance to very dilute sulfuric acid, very dilute nitric acid, acetic acid in the absence of air, dilute sodium hydroxide, sea water and moist sulfurous atmospheres.

Bronze Blue. See Iron blues.

Bronze, Hardware. A non-ferrous alloy containing 89% copper, 9% zinc and 2% lead. It is resistant to hot and cold very dilute sulfuric acid, very dilute cold nitric acid, acetic acid in the absence of air, hot and cold dilute sodium hydroxide, sea water and moist sulfurous atmospheres.

Bronzing Liquid.
(a) A solution of pyroxylin in amyl acetate together with a bronze powder, usually aluminum bronze. (b) Gloss oils and aluminum bronze. (c) Spirit varnishes and aluminum bronze.

Bronzite $(MgFe)SiO_3$. A natural silicate of iron and magnesium containing a larger percentage of iron than enstatite (q.v). and grading to hypersthene (q.v.) with increase of iron. Color, various shades of green and brown. Luster, bronze, submetallic, adamantine-pearly.

Brookite. A natural crystallized titanium oxide. See Rutile.

Broom. See Scoparius.

Brovalol (Bornyl bromovaleriate; Eubornyl; Valisan) $CH_3CH(CH_3)CHBrCOO(C_{10}H_{17})$.
Color and properties: Colorless, oily liquid; slight aromatic odor; contains 25.2% bromine. Marketed as pearls.
Constants: B.p. 163°C. (10 mm.).
Derivation: Esterification of borneol with bromoisovaleric acid.
Uses: Medicine(sedative, unofficial).
Railroad shipping regulations: None.*

Brown Barbary Gum. See Arabic gum.

Brown Coal. See Lignite.

Brown Iron Ore. See Limonite.

Brown Ironstone Clay. See Limonite.

Brown Mustard. See Sinapis nigra.

Brucine (Dimethoxystrychnine) $C_{20}H_{26}O_4N_2 . 4H_2O$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 105°C.
Soluble in alcohol, chloroform and benzene; slightly soluble in water and ether.
Derivation: By extraction and subsequent crystallization from nux vomica or ignatia seeds.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: 1, 5, 10 oz. vials.
Uses: Medicine (paralyzant to the sensory nerves, in the form of the base or the chloride, nitrate or sulfate).
Railroad shipping regulations: None.*
The salts are obtained by the interaction of the acid and the alkaloid.

Salts	Formula	Melting-point	Solubilities
Hydrochloride	$C_{23}H_{26}N_2O_4HCl$	.....	W.
Nitrate	$C_{23}H_{26}N_2O_4HNO_3 . 2H_2O$	230°C.	W.A.
Sulfate	$(C_{23}H_{26}N_2O_4)_2H_2SO_4 . 7H_2O$	......	....

Brucite $Mg(OH)_2$.
A natural magnesium hydroxide. Color, white inclining to gray, blue or green; white streak; pearly or wax-like luster. Contains 69.0% MgO. It is a secondary mineral usually found in serpentine or limestone with magnesite or hydromagnesite.
Constants: Sp.gr. 2.38 to 2.40; hardness 2.5.
Varieties: (1) *Nemalite*—A fibrous variety containing 4 to 5% iron protoxide. (2) *Manganbrucite*—Honey-yellow to brownish-red color. Contains manganese. (3) *Ferrobrucite*—Contains iron.
Occurrence: United States (New Jersey, New York, California, Pennsylvania), Italy, Shetland Isles, Sweden.

Brunfelsia. See Manaca.

Brun Rouge. A red pigment obtained by calcining yellow ocher. See Ocher.

Brunswick Blue. See Iron blues.

Brunswick Green. Formerly the oxychloride of copper but the pigments now sold under this name are usually a mixture of Prussian blue and chrome yellow. The cheaper grades are obtained by reduction with barytes. Brunswick greens are obtainable in the following tints: Light, middle, deep, extra deep. They have good covering power, work well in oil and are fairly permanent but they are acted upon by hydrogen sulfide gas and cannot be mixed with pigments containing alkaline substances or sulfur.

Bryonia.
Dried root of trailing herb, Bryonia alba or B. diocia.
Habitat: Central and northern Europe.
Grades: N.F.
Uses: Medicine (active irritant cathartic).

Bryonin.
A mixture of a glucoside and an alkaloid obtained from bryonia.

Bubulum Oil. See Neats-foot oil.

Bucco. See Buchu.

Buchu (Bucco; Bucku; Buku; Diosma).
Derivation: Dried leaves of Barosma betulina or other species of Barosma.
Habitat: Southern Africa.
Containers: Wooden boxes.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical; U.S.P.
Uses: Medicine (diseases of the urinary organs).
Railroad shipping regulations: None.*

Buchu-leaf Oil.
Color and properties: Dark-colored essential oil, of strong, sweetish, mint-like odor; bitter, cooling taste.
Chief known constituents: Diosphenol, menthone, limonene, dipentene.
Constants: Betulina oil: Sp.gr. 0.937 to 0.97; optical rotation —14° to —48°; refractive index 1.474 to 1.478.
Solubility in alcohol: In 3 to 5 vols. of 70% alcohol (usually); (sometimes) in 8 to 10 vols. of 70% alcohol.
Derivation: Distilled from the leaves of Barosma betulina. There are also oils distilled from the leaves of B. crenulata and B. serratifolia.
Railroad shipping regulations: None.*

Buckthorn. See Frangula.

Buckthorn Berries. See Rhamnus cathartica.

Bucku. See Buchu.

Buffer. A system of acids or bases and their ions which tends to restrain large changes in the hydrogen-ion activity of the solution on the addition or subtraction of acid or alkali. Standard buffers are those solutions of buffers the specific pH values of which have been determined by a standardized procedure.

Standard Buffer Solutions of Clark and Lubs at 20°C.[3] (50 cc. A + x cc. B diluted to 200 cc.):

A = 0.2M KCl[1] B = 0.2M HCl		A = 0.2M KH-o-phthalate B = 0.2M HCl		A = 0.2M KH-o-phthalate B = 0.2M NaOH		A = 0.2M KH_2PO_4 B = 0.2M NaOH		A = 0.2M H_3BO_3[2] + 0.2M KCl B = 0.2M NaOH	
pH	cc. B	pH	cc. B	pH	cc. B	pH	cc. B	pH	cc. B
1.2	64.5	2.2	46.70	4.0	0.40	5.8	3.72	7.8	2.61
1.4	41.5	2.4	39.60	4.2	3.70	6.0	5.70	8.0	3.97
1.6	26.3	2.6	32.95	4.4	7.50	6.2	8.60	8.2	5.90
1.8	16.6	2.8	26.42	4.6	12.15	6.4	12.60	8.4	8.50
2.0	10.6	3.0	20.32	4.8	17.70	6.6	17.80	8.6	12.00
2.2	6.7	3.2	14.70	5.0	23.85	6.8	23.65	8.8	16.30
		3.4	9.90	5.2	29.95	7.0	29.63	9.0	21.30
		3.6	5.97	5.4	35.45	7.2	35.00	9.2	26.70
		3.8	2.63	5.6	39.85	7.4	39.50	9.4	32.00
				5.8	43.00	7.6	42.80	9.6	36.85
				6.0	45.45	7.8	45.20	9.8	40.80
				6.2	47.00	8.0	46.80	10.0	43.90

For information on other buffer solutions consult International Critical Tables, Vol. I, pp. 81-88.

Buffer Index. The increment of acid or base required to produce respectively a unit decrement or increment in the pH value of a solution. A solution has a buffer index of 1 when a liter will take up one gram equivalent of strong acid or alkali per unit change in pH.

pH. Formalistically defined by $\mathrm{pH} = \log_{10} \frac{1}{[\mathrm{H}^+]}$ when $[\mathrm{H}^+]$ is the normality of the hydrogen-ion concentration. Actually the numbers designated by pH do not necessarily conform to the formal definition but are obtained by applying to measurements with the hydrogen electrode a more or less standardized set of assumptions and calculations.

pK. Formalistically defined by $\mathrm{pK} = \log \frac{1}{K}$ where K is the dissociation constant of an acid or a base. Actually the numbers designated by pK are subject to the same qualification mentioned in the definition of pH and also to the added qualification that they depend upon the environment of the acid or base.

Buffing Oils. A viscous, neutral oil of gravity 31° Bé. is typical of oils considered suitable for this purpose.

Bugbane. See Cimicifuga.

Bugwort. See Cimicifuga.

Buhrstone (Burrstone; Millstone).
A hard tough stone used for grinding cereals, cement, rock, paint, etc. It is white, gray or creamy in color and is a chalcedonic silica or form of quartz of cellular texture. See Quartz and Chalcedony.
Occurrence: United States (Alabama, Georgia, Mississippi, New York, North Carolina, Ohio, Pennsylvania, Virginia), Canada, France (the best).

Buku. See Buchu.

Bulbocapnine $C_{19}H_{19}NO_4$.
Color and properties: White crystalline powder.
Constants: M.p. 199°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By extraction and subsequent crystallization from the tubers of Corydalis cava.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Buranhem. See Monesia.

Burdock. See Lappa.

Burgundy Mixture.
A liquid insecticide made by adding a solution of copper sulfate to a solution of soda ash. Used as a potato-plant spray.
Railroad shipping regulations: None.*

Burgundy Pitch.
An opaque yellowish or reddish-brown hard brittle resin obtained either from the Norway spruce or the European silver fir. It has a sweet and aromatic taste. Soluble in glacial acetic acid, acetone and alcohol. The resin of Pinus sylvestris is also offered as Burgundy pitch and it can be recognized by the fact that it is soluble in ether, chloroform and solutions of salts of ammonium, sodium carbonate and borax in which true Burgundy pitch is only partially soluble. Common pitch, rosin and turpentine are agitated with water and also offered as Burgundy pitch.

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[1] The pH values of these mixtures are given by Clark and Lubs as preliminary measurements.
[2] The old atomic weight (11.0) of boron is used throughout these tables.
[3] From International Critical Tables, Vol. I, p. 82.

Uses: In medicine (plasters).

Railroad shipping regulations: None.*

Burning Bush. See Euonymus.

Burning Oils, Mineral. Oils possessing properties which will enable them to be burned with a wick. Mineral colza, mineral seal and mineral sperm oils are oils of very high fire test (about 300°F.) and are adapted for lighthouse and locomotive headlight use. See also Illuminating oils.

Burnt Lime. See Calcium oxide.

Burnt Sugar. See Caramel.

Burrage. See Borage.

Burrstone. See Buhrstone.

Butane Dioxime. See Dimethylglyoxime.

Butanol. See Butyl alcohol, normal.

Butea Gum (Bengal kino).

Derivation: Hardened juice obtained from incisions in the stem of Butea frondosa.

Habitat: Hindustan.

Grades: Technical.

Containers: Bags.

Uses: Medicine (laxative and vermifuge).

Railroad shipping regulations: None.*

Buteae Semina. Butea seeds, obtained from Butea frondosa, used in medicine as a vermifuge.

Butesin (Butyl-para-aminobenzoate, normal) $C_6H_4NH_2COOC_4H_9$.

Color and properties: White crystalline powder, odorless, tasteless.

Constants: M.p. 56° to 57°C.; b.p. 147°C. (2 mm.).

Soluble in dilute acids, alcohol, chloroform, ether, benzene and fatty oils; almost insoluble in water.

Uses: Medicine (local anesthetic, similar to benzocaine, q.v., unofficial).

Railroad shipping regulations: None.*

Butesin Picrate (Butyl-para-aminobenzoate trinitrophenol, dinormal) $(C_6H_4NH_2COOC_4H_9)_2C_6H_2(NO_2)_3OH$.

Color and properties: Yellow, amorphous powder; odorless; slightly bitter taste.

Constants: M.p. 109° to 110°C.

Soluble in alcohol, chloroform, ether, benzene and cottonseed oil; difficultly soluble in water.

Uses: Medicine (local anesthetic combining the anesthetic properties of butesin with the antiseptic properties of picric acid, unofficial).

Railroad shipping regulations: None.*

Butter Color. See Annatto.

Butter of Antimony. See Antimony chloride.

Butter of Arsenic. See Arsenic chloride.

Butter of Tin. See Stannic chloride.

Butter Oil. Any edible oil used in the manufacture of oleomargarine or other butter substitute.

Butter Yellow. See Dimethylaminoazobenzene.

Butterine. See Cacao-butter.

Butterine Oil. A term sometimes applied to an inferior peanut oil.

Butternut Bark. See Juglans.

Butterweed Oil. See Erigeron oil.

Button Lac. See Shellac.

Butyl Acetate $CH_3CO_2C_4H_9$.

Color and properties: Limpid colorless, inflammable liquid, fruity odor.

Constants: Sp.gr. 0.872 (21°C); b.p. 125.1°C; (740 mm.); wt. per gal. 7.26 lbs.

Boiling range: At or below 110°C. none; at or below 120°C. not over 15%; at or below 125°C. at least 70%; above 145°C. none.

Soluble in alcohol, ether, and hydrocarbons; slightly soluble in water.

Derivation: Esterification and then distillation after contact of butyl alcohol with acetic acid, in the presence of a catalyst, such as sulfuric acid.

Method of purification: Distillation.

Grades: Technical; pure.

Containers: Tank cars; 50, 100 gal. iron drums; cans; glass bottles.

Uses: Solvent in production of lacquers, lacquer enamels, pyroxlin solutions, leather dope, airplane dope, perfumes, flavoring extracts; solvent for natural gums and synthetic resins.

Railroad shipping regulations: None.*

Butylacetic Acid (Isohexoic acid; Isocaproic acid) $(CH_3)_2CH(CH_2)_2COOH$.

Color and properties: Yellow liquid; rancid odor.

Constants: Sp.gr. 0.925; b.p. 199°C.

Soluble in alcohol and ether; slightly soluble in water.

Derivation: From isoamylcyanide by saponification.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles; carboys.

Uses: Extracts; dyes and intermediates.

Railroad shipping regulations: None.*

Butyl Alcohol, Iso-. See Isobutyl alcohol.

Butyl Alcohol, Normal (Butanol; Butyric alcohol) $CH_3(CH_2)_2CH_2OH$.

Color and properties: Limpid, colorless liquid; vinous odor.

Constants: Sp.gr. 0.810 to 0.815 at 20°/20°C.; b.p.: Distils completely between 100°C. and 118°C., with not more than 10% below 115°C. and not more than 2% below 105°C.; acidity, less than 0.03% as acetic acid.

Soluble in water, alcohol and ether.

Derivation: By fermentation of starch and sugars with the Weizmann bacillus.

Method of purification: Distillation.

Grades: Technical. Purity: Butanol: 98 to 100% normal butyl alcohol.

Containers: Crated cans (1 and 5 gals.); 50, 100 gal. iron drums; 8,000 gal. tank cars.

Uses: Solvent for alkaloids, camphor, capsicum, iodine, oils, resins, resorcinol, shellac, varnish gums, waxes; manufacture of rayon; artificial leather; lacquers; cleaning solutions; collodion; color bases; drugs; flavoring extracts; liniments; metal cleaners; motion picture films; paint and varnish removers; patent and enameled leathers; perfumes; pharmaceuticals; photographic films; polishes; pyroxylin plastics; pyroxylin solutions; spirit varnishes and enamels; chemicals (butyl acetate, butyl aldehyde, butesin, butyl butyrate, butyl chloride, butyl propionate, butyl resorcinol, butyl stearate, butylene gas, butyric acid, butyric anhydride, butyryl chloride, butyn, cellulose butyrate, dibutyl aniline, dibutyl oxalate, dibutyl phthalate, isoprene); dehydrating nitrocellulose; alcohol denaturant.

Fire hazard: Dangerous.*

Railroad shipping regulations: None.*

Butyl Alcohol, Secondary (Methylethylcarbinol) $CH_3CH_2CHOHCH_2$.

Color and properties: Limpid, colorless liquid; strong, pleasant odor.

Constants: Sp.gr. 0.803; b.p. 77.8°C.

Soluble in water, alcohol and ether.

Derivation: (a) By the reduction of methylethyl ketone. (b) By the reaction of normal butylene and water in the presence of sulfuric acid.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles; barrels; iron drums.

Uses: Manufacturing fruit essences; organic synthesis.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label (?)*.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Butyl Alcohol, Tertiary (Pseudobutyl alcohol) $(CH_3)_2COHCH_3$.
Color and properties: White crystals; camphor-like odor.
Constants: Sp.gr. 0.786; m.p. 25.5°C.; b.p. 83°C.
Soluble in water, alcohol and ether.
Derivation: By the action of 75% sulfuric acid on isobutylene.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; barrels; iron drums.
Uses: Manufacturing fruit essences; organic synthesis.
Railroad shipping regulations: Red label (?)*

Butyl Aldehyde, Iso-. See Isobutyl aldehyde.

Butyl Aldehyde, Normal (Butyraldehyde, normal; Butalyde) $CH_3(CH_2)_2CHO$.
Color and properties: Water-white liquid.
Constants: Sp.gr. 0.803 to 0.809 (20°/20°); boiling range 71° to 77°C.; acidity less than 1.0% as butyric acid; dryness less than 0.5% of water. No turbidity when one volume of butalyde is mixed with one and one-half volumes of water-saturated benzene.
Derivation: By dehydrogenation of butanol brought about by passing butanol vapors over a catalyst; the butyl aldehyde is separated from the unconverted butanol by distillation.
Grades: Technical. Not less than 93% normal butyl aldehyde.
Containers: Crated cans (1 and 5 gal.); 50, 100 gal. galvanized iron drums.
Uses: Manufacture of dipped rubber goods, rubber cements, rubber accelerators, synthetic resins; butyric acid.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Butylcarbinol, Normal. See Amyl alcohol, primary normal.

Butylcarbinol, Secondary. See Amyl alcohol, active.

Butyl Cellosolve $CH_2OHCH_2OC_4H_9$.
Color and properties: Colorless liquid; mild odor; high dilution ratio with petroleum hydrocarbons.
Constants: B.p. 170.6°C.; weight per gal. 7.6 lbs. at 15.6°C.
Grades: Technical.
Containers: 5, 10, 55, 110 gal. drums (35, 75, 400, 800 lbs.); 8,000 gal. tank cars.
Uses: Brushing lacquers of 4-hour type.
Railroad shipping regulations: None.*

Butylene Isobromide (Dibromoisobutane) $(CH_3)_2CBrCH_2Br$.
Color and properties: Yellowish liquid.
Constants: Sp.gr. 1.798; b.p. 149°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the action of bromine on isobutylene.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Butylmercaptan C_4H_9SH. A military poison gas used in the late war.

Butyl-para-aminobenzoate, Normal. See Butesin.

Butyl-para-aminobenzoate Trinitrophenol, Dinormal. See Butesin picrate.

Butyl Propionate $C_2H_5CO_2C_4H_9$.
Color and properties: Water-white (American Society for Testing Materials Standard).
Constants: Sp.gr. 0.875 at 20°C., 0.874 at 15.5°C.; weight per gal. 7.3 lbs.; b.p. 146°C. (commercial grades boil over a range of 130° to 150°C. due to presence of butyl alcohol and esters); flash point 105°F.
Solubility: Soluble in alcohol and ether; miscible with all coal-tar and petroleum distillates; very slightly soluble in water.
Derivation: Esterfication of propionic acid with butyl alcohol with sulfuric acid as a catalyst.
Method of purification: Fractional distillation.
Grades: Technical (85 to 90%, 90 to 95% ester content).
Containers: Cans; 55, 110 gal. steel drums; tank cars.
Uses: Solvent for nitrocellulose; retarder in lacquer thinner; brushing lacquers.
Railroad shipping regulations: None.*

Butyl Stearate $C_{17}H_{35}COOC_4H_9$.
Color and properties: A colorless, stable, oleaginous material solidifying at about 19°C. Faint fatty odor.
Constants: Sp.gr. 0.855 to 0.857 (25°/15°); m.p. 19.5° to 20°C.; boiling range 220° to 225°C. at 25 mm.; acidity less than 1.5% as stearic acid.
Grades: Technical.
Containers: Crated cans (1, 5 gals.); 50, 100 gal. steel drums.
Uses: Lubricating, softening and plasticizing agent.
Railroad shipping regulations: None.*

Butyn (Para-aminobenzoyl-gamma-dinormal butylaminopropanol sulfate; Dibutylaminopropyl-para-aminobenzoate normal sulfate, gamma-) $(C_{18}H_{30}O_2N_2)_2H_2SO_4$.
Color and properties: White, odorless powder which rapidly produces a sense of numbness when placed upon the tongue; more toxic than procaine.
Constants: M.p. 98° to 100°C.
Soluble in less than its own weight of water at 20°C.; slowly soluble in cold water, rapidly soluble in hot water; soluble in warm alcohol and acetone from which it does not readily separate; slightly soluble in chloroform and insoluble in ether.
Derivation: Synthetic.
Method of purification: Crystallization.
Grades: N.N.R.
Containers: Brown amber bottles.
Uses: Local anesthetic.
Railroad shipping regulations: None.*

Butyaldehyde, Iso-. See Isobutyl aldehyde.

Butyraldehyde, Normal. See Butyl aldehyde, normal.

Butyric Acid (Propylformic acid; Ethylacetic acid) $CH_3(CH_2)_2CO_2H$.
Color and properties: Colorless, limpid liquid; rancid odor.
Constants: Sp.gr. 0.9599; m.p. —3.12°C.; b.p. 162.3°C.
Soluble in water, alcohol and ether.
Derivation: (a) By butyric fermentation of starch paste in the presence of a little tartaric acid; putrefied meat or cheese being added after a few days. (b) Pure cultures of special bacteria are also used. (c) From molasses residues by the Effront process.
Grades: Technical.
Containers: 100 lb. carboys.
Strength of solution: Technical—60%.
Uses: Chemicals (butyrates); tanning and deliming agent; butter making; flavor; drug; water purification; varnishes.
Railroad shipping regulations: None.*

Butyric Alcohol. See Butyl alcohol.

Butyric Ether. See Ethyl butyrate.

Buxine. See Bebeerine.

Bytownite. See Feldspar.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

C

C Acid. See 2-Naphthylamine-4: 8-disulfonic acid.

Cabbage Oil. See Elder oil.

Cabbage-seed Oil.
Derivation: A variety of mustard oil, from Brassica oleracea.
Uses: Illuminant; soap manufacture; ointments and liniments; edible oil, substitute for olive oil.
Railroad shipping regulations: None.*

Cable Wax. See Waxes, combination; Waxes, saturating; Waxes, finishing.

Cacao Beans. Seeds of the cacao tree, Theobroma cacao, native to Mexico, West Indies, and South America and cultivated in all tropical countries. The fruit are 6 to 8 inches long with a thick rind enclosing a whitish pulp in which numerous seeds are imbedded. Used in the manufacture of cocoa and chocolate.

Cacao Butter (Theobroma oil; Cocoa butter; Butterine; Cacao oil).
Color and properties: Yellowish, brittle, solid fat; chocolate odor and taste.
Constants: Sp.gr. 0.976 to 0.995; saponification value 192 to 200; iodine value 32 to 37.7; m.p. 30° to 35°C.
Soluble in ether, chloroform, benzene and alcohol.
Derivation: From the cacao bean, by expression, decoction or extraction by solvent.
Chief constituents: Glycerides of stearic, palmitic and lauric acids.
Grades: Crude; refined; U.S.P.
Containers: Wooden barrels; tins.
Uses: Pharmacy for preparing ointments and suppositories and coating pills; toilet soaps; confectionery.
Railroad shipping regulations: None.*

Cacao Oil. See Cacao butter.

Cacao Products.
The United States Department of Agriculture standards for cacao products are as follows:
(1) Cocoa nibs, cracked cocoa, is the roasted, broken cocoa bean freed from its shell or husk.
(2) Chocolate, plain chocolate, bitter chocolate, chocolate liquor, bitter chocolate coatings, is the solid or plastic mass obtained by grinding cocoa nibs without the removal of fat or other constituents except the germ, and contains not more than three (3) % of ash insoluble in water, three and fifty hundredths (3.50) % of crude fiber, and nine (9) % of starch, and not less than forty-five (45) % of cocoa fat.
(3) Sweet chocolate, sweet chocolate coatings, is chocolate mixed with sugar (sucrose), with or without the addition of cocoa butter, spices, or other flavoring materials, and contains in the sugar- and fat-free residue no higher percentage of either ash, fiber, or starch than is found in the sugar- and fat-free residue of chocolate.
(4) Cocoa, powdered cocoa, is cocoa nibs, with or without the germ, deprived of a portion of its fat and finely pulverized, and contains percentages of ash, crude fiber, and starch corresponding to those in chocolate after correction for fat removed.
(5) Sweet cocoa, sweetened cocoa, is cocoa mixed with sugar (sucrose), and contains not more than sixty (60)% of sugar (sucrose), and in the sugar- and fat-free residue no higher percentage of either ash, crude fiber, or starch than is found in the sugar- and fat-free residue of chocolate.
See also Cacao butter; Cacao beans; Cacao shells; Chocolate fat.

Cacao Shells (Theobroma shells; Cocoa shells).
Derivation: Shells of the seed of Theobroma cacao.
Habitat: South America, Mexico and West Indies.
Containers: Bags.
Uses: Medicine; manufacture of theobromine.
Railroad shipping regulations: None.*

Cachalong. See Opal.

Cachou. See Catechu.

Cacodyliacol (Guaiacol cacodylate) $CH_3OC_6H_4As(CH_3)_2O_2.H_2O$.
Color and properties: Reddish-white, crystalline mass; decomposed by water with liberation of cacodylic acid.
Soluble in alcohol and fixed oils.
Uses: Medicine (hypodermic treatment of tuberculosis, unofficial).
Railroad shipping regulations: None.*

Cacodylic Acid (Dimethylarsenic acid; Kakodylic acid) $(CH_3)_2AsOOH$.
Color and properties: Colorless, odorless, deliquescent crystals; poisonous!
Constants: M.p. 200°C.
Soluble in water and alcohol.
Derivation: By distilling a mixture of arsenic trioxide and potassium acetate.
Grades: Technical.
Containers: Iron drums.
Uses: Synthesis of dyes, drugs and perfumes.
Railroad shipping regulations: Class B poison.

Cactus Grandiflorus (Night-blooming cereus).
Fresh stem of large fleshy shrub, Selenicereus grandiflorus.
Habitat: Jamaica.
Grades: N.F.
Uses: Medicine (dropsy).

Cadaverine. See Ptomaines.

Cade Oil (Cadmium oil).
Color and properties: Thick, clear, dark brown liquid; tarry odor; burning, bitter taste. Chief known constituent; Cadinene $C_{15}H_{24}$.
Constants: Sp.gr. 0.980 to 1.055.
Soluble in ether, chloroform; partially soluble in alcohol.
Derivation: By the dry distillation of the wood of Juniperus oxycedrus.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: 1, 5, 10 lb. bottles; 25 lb. tins.
Uses: Medicine (skin diseases); animal soap; ointments.
Railroad shipping regulations: None.*

Cadinum Oil. See Cade oil.

Cadmium Cd.
Color and properties: Silver-white, blue-tinged malleable metal. Occurs as carbonate and sulfide in zinc ores: rarely as green or kite.
Constants: Sp.gr. 8.642; m.p. 321°C.; b.p. 766°C.
Soluble in acids; insoluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: (a) By extraction from roasted zinc blend, as cadmium sulfate forms the residue. (b) In the reduction of zinc, the cadmium being more volatile, is obtained as a brownish powder. Refined by distillation at low red heat, with reducing material.
Forms available: Pencils or rods 5/16"×12" packed in 100 lb. wooden boxes.
Purity: 99.5 to 99.9%.
Uses: Metallurgy (fusible metals, electroplating, copper alloys for electrical conductors, jewelry alloys, solder for aluminum and as a substitute for tin in solders, deoxidizer in nickel plating, alloys for fine castings); cadmium salts; cadmium vapor lamps; electric measuring instruments; lamp filaments; ceramics; coloring glass; white pigments; dental amalgams; process engraving and lithography.
Railroad shipping regulations: None.*
See also Cadmium plating.

Cadmium Bromate $Cd(BrO_3)_2.H_2O$.
Color and properties: White crystals or crystalline powder.
Constants: Sp.gr. 3.758; m.p.: Decomposes.
Soluble in water; insoluble in alcohol.
Derivation: By adding cadmium sulfate to a solution of barium bromate.
Method of purification: Recrystallization.
Grades: Pure; reagent.
Containers: Glass bottles; 25 lb. tin boxes.
Uses: Analytical reagent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Cadmium Bromide $CdBr_2$.
Color and properties: Yellowish, crystalline powder.
Constants: Sp.gr. 5.192; m.p. 568°C.; b.p. 806° to 812°C.
Soluble in water and alcohol; slightly soluble in ether.
Derivation: By heating cadmium to redness in bromine vapor.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. cans; 100 lb. cases.
Uses: Photography; process engraving; lithography.
Railroad shipping regulations: None.*

Cadmium Chloride
(a) $CdCl_2$; (b) $CdCl_2.2H_2O$.
Color and properties: Small white crystals.
Constants: Sp.gr. (a) 4.05, (b) 3.327; m.p. (a) 568°C.; b.p. (a) 861° to 954°C.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on cadmium with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; tins; wooden kegs.
Uses: Preparation of cadmium sulfide; analytical chemistry; photography; dyeing and calico printing; ingredient of baths for producing galvanic metallic deposits; addition to tinning solutions.
Railroad shipping regulations: None.*

Cadmium Hydrate. See Cadmium hydroxide.

Cadmium Hydroxide (Cadmium hydrate) $Cd(OH)_2$.
Color and properties: White, amorphous powder.
Constants: Sp.gr. 4.79; m.p.: Loses H_2O at 300°C.
Soluble in acids and ammonium hydroxide; insoluble in water and alkalis.
Derivation: By the action of sodium hydroxide on a cadmium salt solution.
Grades: Technical; C.P.
Containers: Glass bottles; boxes.
Uses: Cadmium salts.
Railroad shipping regulations: None.*

Cadmium Iodide CdI_2.
Color and properties: White, flaky crystals.
Constants: Sp.gr. 5.644; m.p. 385°C.; b.p. 708° to 719°C.
Soluble in water and alcohol.
Derivation: By the action of hydriodic acid on cadmium oxide.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5, 10 lb. bottles.
Uses: Photography; medicine (treatment of cutaneous diseases); process engraving and lithography.
Railroad shipping regulations: None.*

Cadmium Lithopone. See Lithopone, cadmium.

Cadmium Nitrate $Cd(NO_3)_2.4H_2O$.
Color and properties: White, amorphous pieces or hygroscopic needles. Keep well stoppered.
Constants: Sp.gr. 2.455; m.p. 59.5°C.; b.p. 132°C.
Soluble in water and alcohol.
Derivation: By the action of nitric acid on cadmium or cadmium oxide and crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Tins; glass bottles.
Uses: Ceramic industry (for coloring glass and porcelain).
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Cadmium Plating. Electroplating with cadmium was undertaken as early as 1849, but was first put into commercial use about 1920. It is used for the protection against corrosion of metallic objects, mainly iron and steel but also copper, zinc, aluminum and their alloys. Cadmium is anodic to iron under practically all conditions, and dissolves before the iron is attacked, but slowly, as the electromotive force is small. Contrary to zinc, cadmium is hardly touched by alkali; it is easily dissolved in acids but at higher hydrogen-ion concentration than zinc. Its economical use is made possible by the fact that a 0.0002 to 0.0003" cadmium coating gives the same protection under ordinary conditions as a .0010" thick zinc coating, and that cadmium is deposited about twice as fast as zinc at a given current density. All commercial cadmium plating baths are of the cyanide type. They usually contain 2 to 5 oz. per gal. of metal, generally obtained from the oxide, hydrate, carbonate or cyanide, dissolved in sodium carbonate with an excess of 4 to 10 oz. per gal. "free" sodium cyanide, and an organic addition agent as necessary constituents. The bath is operated at room temperature with cadmium anodes. The current density is 10 to 30 amperes per sq. ft. and the current efficiency is over 90%. Pure metal and salts and a suitable addition agent makes the solution produce a very dense, lustrous and ductile plate on properly cleaned work. Cadmium plating is also used as a first coat in nickel and nickel-chromium plating, the rust resistance of cadmium nickel being about three times greater than that of copper nickel. Cadmium plating has found its widest application for rust proofing in the automotive, ship-building, aeronautical, and radio industries.

Cadmium-potassium Iodide $CdI_2.2KI.2H_2O$.
Color and properties: White powder.
Constants: Sp.gr. 3.359.
Soluble in water, alcohol and ether.
Derivation: By combining cadmium iodide and potassium iodide in solution, in proportion of their combining weights and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Tins; glass bottles.
Uses: Analytical chemistry; medicine.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Cadmium Salicylate $Cd(C_7H_5O_3)_2+H_2O$.
Color and properties: Colorless crystals or white powder.
Soluble in water, alcohol, ether and glycerol.
Derivation: Action of salicylic acid on cadmium oxide.
Uses: Medicine (antiseptic).
Railroad shipping regulations: None.*

Cadmium Sulfate (a) $CdSO_4$; (b) $3CdSO_4.8H_2O$; (c) $CdSO_4.4H_2O$.
Constants: Sp.gr. (a) 4.72; (b) 3.087; (c) 3.05; m.p. (a) 1,000°C.
Soluble in water.
Derivation: By the action of dilute sulfuric acid on cadmium or cadmium oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; tins; kegs.
Uses: Manufacture of normal cadmium electric cells.
Railroad shipping regulations: None.*

Cadmium Sulfide (Cadmium yellow; Orange cadmium; Orient yellow; Aurora yellow; Jaune brilliant) CdS.
Color and properties: Light yellow powder.
Constants: Sp.gr. 3.9 to 4.8; b.p. 980°C.
Soluble in acids; insoluble in water.
Derivation: By passing hydrogen sulfide gas into a solution of a cadmium salt, acidified with hydrochloric acid. The precipitate is filtered and dried.
Grades: Technical.
Containers: 100 lb. kegs; 200 lb. cases.
Uses: Paint pigments; soap color; pyrotechnics; mixing with ultramarine to produce green pigments; ceramic glazes; printing inks; paper pigment; rubber pigment.
Railroad shipping regulations: None.*

Cadmium Tungstate (Cadmium wolframate) $CdWoO_4$.
Color and properties: Yellow crystals.
Soluble in ammonium hydroxide; very slightly soluble in water.
Derivation: By the interaction of cadmium nitrate and ammonium tungstate.
Grades: Technical.
Containers: Barrels.
Uses: Fluorescent paint.
Railroad shipping regulations: None.*

Cadmium Wolframate. See Cadmium tungstate.

Cadmium Yellow. See Cadmium sulfide.

Caesium Compounds. See corresponding cesium compound.

Caffea. See Coffee.

Caffea usta. Roasted coffee beans.

Caffea viridis. Dry, unroasted coffee beans.

Caffeine (Theine; Guaranine; Methyltheobromine; Trimethylxanthin; Coffeine) $C_8H_{10}N_4O_2.H_2O$.
Color and properties: White, fleecy masses or long flexible, silky crystalline alkaloid.
Constants: M.p. 236.8°C.
Soluble in chloroform; slightly soluble in water and alcohol; very slightly soluble in ether.
Derivation: By extraction of coffee, tea, guarana, paraguay tea or kola nuts, evaporation of the solvent and crystallization.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: 1 lb. bottles; 5, 10, 25 lb. cans; 100 lb. cases; 150 lb. drums.
Uses: Medicine (particularly for its effect upon the brain, in form of basic alkaloid or as the arsenate, arsenite, benzoate, borocitrate, citrate (U.S.P.), diïodide, hydriodate, hydrobromide, hydrochloride, phosphate, phthalate, salicylate, sulfate, sodio benzoate (U.S.P.), sodio salicylate, valeriate, etc., because of their solubility in alcohol, water and ether.
Railroad shipping regulations: None.*

Caffeine-sodium Benzoate. A mixture of caffeine and sodium benzoate containing 47% to 57% anhydrous caffeine. Its uses are similar to caffeine, but it is more soluble in water.

Cahoun Oil. See Cohune oil.

Cahune Oil. See Cohune oil.

Cairngorm (Smoky quartz).
A form of native silica or quartz (q.v.). Color, smoky yellow to dark smoky brown, sometimes brownish black.
Occurrence: Scotland.

Cajeputene. See Dipentene.

Cajeputol. See Eucalyptol.

Cajuput Oil (Kyapootic oil).
Color and properties: Essential oil. Crude: Bluish-green to green. Rectified: Colorless or yellowish. Pleasant camphor-like odor; aromatic taste which at first imparts a burning sensation and later changes to a cooling one.
Chief known constituents: Cineole, alpha-terpineol, pinene.
Constants: Sp.gr. 0.919 to 0.930 at 15°C.; optical rotation slightly levogyrate to —3°40′; refractive index 1.466 to 1.471.
Solubility in alcohol: In 1 vol. and more of 80% alcohol; in 2.5 to 3 vol. of 70% alcohol (occasionally).
Derivation: Distilled from the fresh leaves and twigs of several species of Melaleuca but mostly from those of Melaleuca leucadendron, L. and minor.
Uses: Medicine.
Railroad shipping regulations: None.*

Calabamine. See Physostigmine.

Calabar. See Physostigma.

Calafatite.
A Spanish grade of alunite (q.v.).

Calafene.
Trade name for a product used in the leather trade as a filler and in connection with pigment finishes, as a binder or carrying agent to prevent precipitation of the pigment. It is used quite generally in the manufacture of artificial leather from paper, where it serves the purpose of acting as a binder between latex and pyroxylin. It is soluble in hot or boiling water, and when allowed to dry or oxidize, gives a coating, which is permanent.

Calamine. Alkaloid found in calamus.

Calamine (Electric calamine) $2ZnO.SiO_2.H_2O$.
White, yellow or brownish-white mineral. Luster, vitreous to pearly. Contains 67.5% zinc oxide.
Soluble in acids.
Constants: Sp.gr. 3.4 to 3.5; hardness 4.5 to 5.
Occurrence: United States (Missouri, New Jersey, Virginia, Tennessee, Arkansas, Nevada, Connecticut, Kansas, Maryland, Oklahoma, Pennsylvania).

Calamine, Prepared. Zinc oxide containing a small amount of ferric oxide. A fine, pink powder, insoluble in water. Used in pharmacy to impart a flesh color to ointments, washes and powders.

Calamintha Oil. See Marjoram oil.

Calamus (Sweet flag; Calmus; Sweet cane; Sweet grass).
Derivation: Unpeeled, dried rhizome of Acorus calamus.
Habitat: Europe, North America and western Asia.
Grades: U.S.P.
Containers: Bales; bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Calamus Oil.
Color and properties: Yellow to brownish-yellow oil; aromatic camphor-like odor; bitter, burning, spicy taste.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Chief known constituents: Asarone, asarylic aldehyde, eugenol, acetic acid, palmitic acid.
Constants: Sp.gr. 0.959 to 0.970 at 15°C.; optical rotation +9° to +31°; refractive index 1.5028 to 1.5078; acid value up to 2.5; saponification value 6 to 20; ester value after acetylation 32 to 50.
Solubility in alcohol: In all proportions with 90% alcohol; in 15 vols. of 80% alcohol; in 1,000 vols. of 50% alcohol.
Derivation: By steam distillation of the root of Acorus calamus, L.
Uses: Preparation of liqueurs; medicine; perfumery.
Railroad shipping regulations: None.*

Calaverite (Au, Ag)Te_2.
One of the gold telluride group of minerals. Corresponds to the same general formula as sylvanite (q.v.) and krennerite (q.v.). Pale bronze-yellow color or tin-white, tarnishing to bronze yellow on exposure. Metallic luster. Contains 40 to 43% gold, 1 to 3% silver.
Constants: Sp.gr. 9.15 to 9.39; hardness 2.5.
Occurrence: United States (California, Colorado), Australia.
Uses: Important source of gold.

Calbroben. See Calcium dibromobehenate.

Calc-Sinter. See Travertine.

Calc Tufa. See Travertine.

Calcic Liver of Sulfur. See Lime, sulfurated.

Calcined Baryta. See Barium oxide.

Calcinol. See Calcium lactate.

Calciovolborthite. A natural vanadate of copper and calcium. Contains about 38% V_2O_5.
Occurrence: United States (California, Colorado, Utah, Oregon), Germany.

Calcite (Calcspar) $CaCO_3$.
The most common form of calcium carbonate. Corn spar, dog-tooth spar, hog-tooth spar, Iceland spar, nail-head spar, satin spar are varieties of crystallized calcite. It is the essential constituent of limestone, marble and chalk.

Calcium Ca.
Color and properties: Soft, white metal; brilliant crystalline surface when freshly cut. Keep dry, in well stoppered bottles.
Constants: Sp.gr. 1.5446; m.p. 805°C.
Soluble in acid; decomposes water slowly.
Derivation: By electrolyzing molten calcium chloride.
Containers: Air-tight tins; glass bottles.
Railroad shipping regulations: None.*

Calcium Acetate (Vinegar salts; Gray acetate; Lime pyrolignite) $Ca(C_2H_3O_2)_2.H_2O$.
Color and properties: Brown or gray lumps or white crystals.
Soluble in water; slightly soluble in alcohol.
Derivation: By the action of pyroligneous acid on calcium hydroxide, the solution being filtered and evaporated to dryness, yielding gray acetate of lime. If the acid is neutralized with lime before distilling off the methyl alcohol, the product is contaminated with much tar and when evaporated to dryness forms "brown acetate of lime."
Method of purification: Recrystallization.
Grades: Technical (80% basis); brown, gray, pure; C.P.
Containers: 1, 5 lb. bottles; 1 lb. cans; 200 lb. bags.
Uses: Manufacture of acetone; manufacture of acetic acid; dyeing and calico printing.
Railroad shipping regulations: None.*

Calcium Arsenate (Tricalcium ortho-arsenate) $Ca_3(AsO_4)_2$.
Color and properties: White powder.
Very slightly soluble in water.
Derivation: By the interaction of calcium chloride and sodium arsenate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; ½, 1, 3 lb. bags; 24, 48 lb. net cases; 100 lb. barrels.
Uses: Insecticide; germicide.
Railroad shipping regulations: Class B poison.

Calcium Arsenite $CaAsO_3H$.
Color and properties: White, granular powder.
Insoluble in water.
Derivation: By the interaction of calcium chloride and sodium arsenite.
Grades: Technical.
Containers: Wooden barrels.
Uses: Germicides; insecticides.
Railroad shipping regulations: Class B poison.

Calcium Benzoate $Ca(C_7H_5O_2)_2.3H_2O$.
Color and properties: White powder or crystals. Keep well stoppered.
Soluble in water.
Derivation: Chlorine is passed into heated toluene, followed by precipitation with milk of lime, using powdered iron as catalyst.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (alterative, antiseptic).
Railroad shipping regulations: None.*

Calcium Beta-naphtholsulfonate (Abrastol; Asaprol) $Ca(C_{10}H_6OHSO_3)_2.3H_2O$.
Color and properties: Pale red powder.
Soluble in water and alcohol.
Uses: Medicine (antipyretic, analgesic).
Railroad shipping regulations: None.*

Calcium Biphosphate. See Calcium phosphate, monobasic.

Calcium Bisulfite $Ca(HSO_3)_2$.
Color and properties: Yellowish liquid with strong sulfur dioxide odor.
Soluble in water and acids.
Derivation: By action of sulfur dioxide on calcium hydroxide.
Strength of solution: 8°Bé.
Grades: Technical.
Containers: Iron drums.
Uses: Antichlor in bleaching textiles; paper pulp (dissolving lignin); preservative; bleaching sponges; chromium bisulfite; hydroxylamine salts.
Railroad shipping regulations: None.*

Calcium Bromide (a) $CaBr_2$; (b) $CaBr_2.6H_2O$.
Color and properties: White, granular, very deliquescent crystals; sharp, saline taste.
Constants: Sp.gr. (a) 3.353. M.p. (a) 680° to 760°C.; (b) 35°C. B.p. (a) 806° to 812°C.; (b) 149° to 150°C.
Soluble in water and alcohol.
Derivation: By the action of hydrobromic acid on calcium oxide, carbonate or hydroxide and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. jars; 25, 50, 100 lb. cases.
Uses: Manufacturing mineral waters; photography; medicine (nerve sedative).
Railroad shipping regulations: None.*

Calcium Carbide ("Carbide") CaC_2.
Color and properties: Grayish-black, irregular lumps; must be kept dry.
Constants: Sp.gr. 2.22.
Decomposes in water, with formation of acetylene.
Derivation: By the interaction of finely pulverized limestone or quick lime with crushed coke or anthracite in an electric furnace.
Grades: Technical.
Containers: 100 lb. kegs; 220 lb. drums.
Uses: Generation of acetylene gas; signal fires; reduction of copper sulfide and metallic oxides; production of calcium cyanamide; manufacture

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

of graphite and hydrogen; electrical (dehydrating agent in electrostatic work); desiccated foods (dehydrating agent); synthesis of acetaldehyde and acetic acid; steel hardening.
Fire hazard: Must be kept away from water.*
Railroad shipping regulations: None.*

Calcium Carbonate (Precipitated chalk) $CaCO_3$.
Color and properties: White, amorphous powder or colorless crystals.
Constants: Sp.gr. 2.72 to 2.95.
Soluble in acids; insoluble in water.
Derivation: (a) As a precipitate by adding a soluble carbonate to a calcium salt solution. (b) Also found in nature in many forms; see Calcite, Aragonite, Limestone, Marble, Chalk, Lithographic stone, Marl, Marlstone, Travertine.
Grades: Technical; precipitated; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. kegs; bulk.
Uses: Metallurgy (flux); manufacture of lime; dentifrices; paint pigments; ceramics; glass; building stone; carbon dioxide; organic synthesis.
Railroad shipping regulations: None.*

Calcium Chlorate $Ca(ClO_3)_2.2H_2O$.
Color and properties: White to yellowish crystals. Keep well stoppered.
Soluble in water and alcohol.
Derivation: By the action of chlorine on calcium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron canisters; glass bottles.
Uses: Photography, pyrotechnics.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Calcium Chloride (a) $CaCl_2$; (b) $CaCl_2.H_2O$; (c) $CaCl_2.6H_2O$.
Color and properties: White, deliquescent crystals, granules, lumps or flakes.
Constants: Sp.gr. (a) 2.152; (c) 1.654.
Soluble in water and alcohol.
Derivation: (a) By the action of hydrochloric acid on calcium carbonate and subsequent crystallization.
(b) Commercially obtained as a by-product in the Solvay soda and other processes.
Method of purification: Recrystallization.
Grades: C.P.; U.S.P.; technical; solid (73-75%), powder (77-80%), flake (77-80%), liquid (38.6%).
Containers: C.P.: 1, 5 lb. bottles; powder: 400 lb. drums; solid: 650, 665 lb. drums; flake: 100 lb. bags; 375, 400 lb. drums; liquid: tank cars.
Uses: Dehydrating agent; food preservative; road dressing; fireproofing paints; freezing mixtures and solutions; sizing compounds; mineral waters; chemical (ammonium chloride, precipitated chalk, tartaric acid, drying gases); gunpowder; wood preservative; hydraulic pressure solutions; metallic calcium; automobile anti-freezes; fire bucket and automatic sprinkler solutions; dry colors; dehydrating petroleum distillates; pharmaceutical preparations; water purification.
Railroad shipping regulations: None.*

Calcium Citrate (Lime citrate).
A by-product in the manufacture of citric acid.
Grades: Purified; C.P.
Containers: Glass bottles; 50 lb. boxes; 100 lb. kegs; barrels.
Uses: Pharmaceuticals (to make tablets more easily soluble).
Railroad shipping regulations: None.*

Calcium Cyanamide (Lime nitrogen; Nitrolim; Cyanamide) $CaCN_2$.
Color and properties: White crystals.
Decomposes in water, liberating ammonia.
Derivation: Calcium carbide is finely powdered and heated in an electric oven, into which nitrogen is passed. The charge remains in the furnace 24 to 36 hrs. It is then removed and any uncombined calcium carbide is leached out.
Grades: Technical.
Containers: 200 lb. bags; 350 lb. barrels; bulk in cars.
Uses: Fertilizers; nitrogen products; hardening iron and steel.
Railroad shipping regulations: None.*

Calcium Dibromobehenate (Sabromin; Asabromin; Calbroben) $(C_{22}H_{41}O_2Br_2)_2Ca$.
Color and properties: White powder; odorless; tasteless; contains 29% bromine after drying.
Soluble in ether and chloroform; insoluble in water, alcohol and acetone.
Uses: Medicine (sedative, hysteria, neurasthenia, insomnia, unofficial).
Railroad shipping regulations: None.*

Calcium Ferrocyanide $Ca_2Fe(CN)_6.12H_2O$.
Color and properties: Yellow crystals.
Soluble in hot water.
Derivation: By decomposing ferriferrocyanide with quicklime in a closed vessel with steam. The solution of calcium ferrocyanide is evaporated and recovered by crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Potassium ferrocyanide.
Railroad shipping regulations: None.*

Calcium Fluoride CaF_2.
Color and properties: White powder, occurring in nature as fluorite or fluorspar.
Constants: Sp.gr. 3.15 to 3.18; m.p. 1,300°C.
Soluble in concentrated sulfuric acid; insoluble in water.
Derivation: (a) By powdering pure fluorite or fluorspar. (b) By the interaction of a soluble calcium salt and sodium fluoride.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels; freight cars.
Uses: Flux in metallurgy; manufacturing hydrofluoric acid; ceramics; enamels; etching glass; calcium cyanamide.
Railroad shipping regulations: None.*
See also Fluorspar.

Calcium Glycerinophosphate. See Calcium glycerophosphate.

Calcium Glycerophosphate (Calcium glycerinophosphate) $Ca(C_3H_8O_6P)_2$.
Color and properties: White, crystalline powder.
Derivation: By esterification of phosphoric acid with glycerol and conversion of glycerophosphoric acid to the calcium salt.
Grades: Technical; pure; U.S.P.
Containers: 1, 5 lb. bottles; 5, 10, 25 lb. tins; 200 lb. barrels.
Uses: Medicine.
Railroad shipping regulations: None.*

Calcium Guaiacolsulfonate. See Guaiacyl.

Calcium Hippurate $Ca(C_9H_8NO_3)_2.3H_2O$.
Color and properties: White crystals or powder.
Soluble in hot water.
Derivation: Interaction of calcium carbonate with hippuric acid.
Uses: Medicine (similar to calcium benzoate, unofficial).
Railroad shipping regulations: None.*

Calcium Hydrate. See Calcium hydroxide.

Calcium Hydroxide (Calcium hydrate; Lime hydrate) $Ca(OH)_2$.
Color and properties: White, dry powder.
Constants: Sp.gr. 2.078; m.p.: Loses water at 580°C.
Very slightly soluble in water.
Derivation: By the action of water on calcium oxide.
Impurities: Calcium carbonate, magnesium salts, iron.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical; chemical lime (insoluble matter under 2%, Mg under 3%); building lime.
Containers: Wooden barrels; paper bags.
Uses: Mortar; cements; calcium salts; causticizing soda; hydrogen; depilatory; lime paints; medicine (antacid in dyspepsia and nausea); agriculture; ammonia recovery in gas manufacture; candle manufacture; disinfectant; water softening; purification of sugar juices.
Railroad shipping regulations: None.*

Calcium Hypochlorite (Calcium oxychloride; "Chloride of lime"; Calx chlorinata; Bleaching powder; Bleach; Chlorinated lime; Hypochlorite of lime) $CaOCl_2$.
Color and properties: White powder; strong chlorine odor.
Decomposes in water and acids.
Derivation: By conducting chlorine into a box-like structure containing slaked lime spread upon perforated shelves.
Grades: Technical; U.S.P.
Containers: 10 lb. cans; 58, 100, 130, 300, 325, 453, 800 lb. steel drums; 415 lb. wooden barrels.
Uses: Textile bleaching; organic synthesis; deodorizer; disinfectant.
Railroad shipping regulations: None.*

Calcium Hypophosphite (Lime hypophosphite) $Ca(H_2PO_2)_2$.
Color and properties: White to grayish-white crystals or powder.
Soluble in water.
Derivation: By boiling lime, water and phosphorus together, with subsequent crystallization from the solution.
Method of purification: Recrystallization.
Grades: Technical; N.F.; U.S.P.
Containers: 1 lb. bottles, cartons; 5, 10, 25, 50 lb. tins.
Uses: Medicine (for its hypophosphite value).
Railroad shipping regulations: None.*

Calcium Iodide CaI_2.
Color and properties: Yellowish-white powder; decomposes in air by absorption of carbon dioxide.
Constants: Sp.gr. 3.956; m.p. 631° to 740°C.; b.p. 708° to 719°C.
Soluble in water, ethyl alcohol and amyl alcohol.
Derivation: By the action of hydriodic acid on calcium carbonate.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1, 5, 7 lb. bottles.
Uses: Photography.
Railroad shipping regulations: None.*

Calcium Iodobehenate (Sajodin; Calioben) $(C_{22}H_{42}O_2I)_2Ca$.
Color and properties: White or yellowish powder containing approximately 26% iodine; unctuous to the touch; odorless, or slight fatty odor.
Soluble in warm chloroform; only slightly soluble in alcohol and ether; insoluble in water.
Derivation: Combination of erucic and hydriodic acids with a soluble calcium salt.
Uses: Medicine (chronic bronchitis, asthma, arteriosclerosis, chronic arthritis, etc.).
Railroad shipping regulations: None.*

Calcium Lactate (Calcinol) $Ca(C_3H_5O_3)_2.5H_2O$.
Color and properties: White, almost tasteless powder.
Constants: M.p.: Loses $3H_2O$ at 100°C.
Soluble in water.
Derivation: By neutralizing dilute lactic acid with calcium carbonate and evaporating the solution.
Grades: Technical; U.S.P.
Containers: 5, 25, 50 lb. boxes; 100 lb. kegs; 500, 600 lb. barrels.
Uses: Medicine (to control hemorrhage, and as a carrier of calcium); in the manufacture of calcium lactophosphate.
Railroad shipping regulations: None.*

Calcium Linoleate $Ca(C_{18}H_{31}O_2)_2$.
Color and properties: White, amorphous powder.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of solutions of calcium chloride and sodium linoleate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Waterproofing compounds.
Railroad shipping regulations: None.*

Calcium-magnesium Chloride (Magnesium-calcium chloride) $CaCl_2.MgCl_2$.
Color and properties: White, deliquescent crystals.
Soluble in water and acids; insoluble in alcohol and ether.
Derivation: (a) A by-product in the salt industry. (b) By the action of hydrochloric acid on dolomite.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron barrels.
Uses: Same as calcium chloride.
Railroad shipping regulations: None.*

Calcium Mica. See Margarite.

Calcium Molybdate $CaMoO_4$.
Color and properties: White, crystalline powder.
Soluble in mineral acids; insoluble in alcohol, ether or water.
Derivation: By the fusion of calcium oxide and a molybdenum ore.
Grades: Technical.
Containers: Wooden barrels.
Uses: Molybdic acid.
Railroad shipping regulations: None.*
Note: This term is also applied to an alloy used in steel making as a source of molybdenum. It contains approximately 40% molybdenum, 25% calcium oxide and is low in carbon. It is suitable for steel made in the open hearth and the electric furnace.

The molybdenum recovery in this form is equally as good as when ferromolybdenum is used. Calcium molybdate is not made as a final addition like most other ferro-alloys, but is added shortly after the heat is melted. In a basic electric furnace it may be added immediately after slagging off with good results.

Calcium Nitrate (Lime nitrate; Lime saltpeter; Norwegian saltpeter) $Ca(NO_3)_2.4H_2O$.
Color and properties: White, deliquescent mass.
Constants: Sp.gr. 1.82; m.p. 42°C.; b.p. 132°C.
Soluble in water and alcohol.
Derivation: (a) By the action of nitric acid on calcium carbonate. (b) Birkeland-Eyde nitrogen-fixation process.
Method of purification: Crystallization.
Grades: Technical; pure; C.P.
Containers: Wooden kegs; glass bottles.
Uses: Pyrotechnics; fertilizers; other nitrates; incandescent gas mantles.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Calcium Nitrate, German Synthetic $Ca(NO_3)_2$.
Color and properties: White; granular; sharp to the taste; hygroscopic. It is stated to be entirely free from substances harmful to plant life.
Soluble in water.
Derivation: Synthesis of nitrogen as ammonia, oxidation to nitric acid, neutralizing with lime.
Grades: For fertilizer use standardized with ammonium nitrate to contain 15% nitrogen.
Containers: Paper-lined, asphaltum-treated burlap sacks. (Note: Must be kept unopened in a dry place until immediately before use.)
Uses: Fertilizer.
Railroad shipping regulations: None.*

Calcium Ortho-guaiacol Sulfonate. See Guaiacyl.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Calcium Ortho-phosphate. See Calcium phosphate, tribasic.

Calcium Ortho-tungstate. See Calcium tungstate.

Calcium Oxide (Lime; Quicklime; Burnt lime; Calx) CaO.
Color and properties: White, hard lumps, gradually crumbling on exposure to moist air.
Constants: Sp.gr. 3.15 to 3.40; m.p. 2,570°C.
Soluble in acid; very slightly soluble in water, uniting to form calcium hydroxide.
Derivation: Calcium carbonate is roasted in kilns until all of the carbon dioxide is driven off.
Impurities: Calcium carbonate, magnesium oxide, iron, aluminum.
Grades: U.S.P.; technical; chemical lime; agricultural lime; building lime.
Containers: 1, 5 lb. cans; 25, 50 lb. kegs; wooden barrels; bags; freight cars.
Uses: Slaked lime; leather industry; manufacture of heavy chemicals; metallurgy; organic synthesis; rubber industry; medicine (escharotic, depilatory, lime water); production of caustic soda from soda ash in paper, soap, petroleum and other industries; agriculture; compounded animal foods; animal disease protective; ceramics; wood distillation; building industry and products for electrowelding of metals; neutralizing agent in manufacture of nitroglycerin and smokeless powders; petroleum industry; pharmaceuticals; manufacture of photosensitizers; plastics (phenol condensation products); fertilizers; gas manufacture; glues; deodorizing vegetable oils; paints and varnishes; gas mantles; linoleum filler; asphaltic cements; paper manufacture; manufacture of acetone, ethyl and methyl alcohols, and decolorizing carbon from waste sulfite cellulose liquors; soap; candles; preserving eggs; classifying grains in flour mills; manufacture of briquettes from colliery waste; sugar (alcohol and calcium saccharate from waste molasses, defecation of sugar syrups, clarifying sorghum syrups, cement from press cake, ammonia from sugar beet refuse); artificial ice (clarifying turbid water); water purification and treatment (filtration, deodorization, deferrization, sedimentation, softening, neutralization, phenol removal); sanitation (sewage treatment, general disposal of factory waste waters); ammonia recovery from garbage refuse; textiles (mordant in dyeing and printing processes, neutralizing agent in carbonization processes, scouring fabrics preparatory to dyeing and printing).
Railroad shipping regulations: None.*

Calcium Oxychloride. See Calcium hypochlorite.

Calcium Perborate $CaBO_3$.
Color and properties: Gray-white lumps.
Derivation: From the mineral colemanite.
Soluble in acids.
Grades: Crude.
Containers: Freight cars.
Uses: Borax; boric acid.
Railroad shipping regulations: None.*

Calcium Permanganate (Monol) $Ca(MnO_4)_2.4H_2O$.
Color and properties: Violet crystals.
Keep well stoppered.
Soluble in water and ammonia.
Derivation: By mixing pyrolusite and calcium hydroxide, evaporating to dryness and calcining at red heat with access of air. The manganate formed is changed into permanganate by dissolving the melt and passing carbon dioxide into the solution, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; pure.
Containers: Glass bottles; tins; wooden barrels.
Uses: Textile industry; sterilizing water; dentistry; disinfectant.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Calcium Peroxide (Calcium superoxide) $CaO_2.8H_2O$.
Color and properties: Yellow, crystalline powder.
Constants: M.p.: Loses $8H_2O$ at 130°C.
Slightly soluble in water.
Derivation: By the interaction of solutions of a calcium salt and sodium peroxide, with subsequent crystallization.
Grades: Technical.
Containers: Iron canisters; tins; glass bottles.
Uses: Medicine (germicide of doubtful value).
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Calcium Phenosulfonate (Calcium sulfocarbolate; Calcium sulfophenate; Calcium sulfophenylate) $Ca(C_6H_4OHSO_3)_2.5H_2O$.
Color and properties: White, crystalline powder.
Soluble in water and alcohol.
Derivation: By the action of phenolsulfonic acid on calcium hydroxide.
Grades: Technical.
Containers: 1 lb. bottles; 5, 25 lb. cans; 100 lb. kegs; 175 lb. barrels.
Uses: Disinfectant; medicine (intestinal antiseptic, astringent).
Railroad shipping regulations: None.*

Calcium Phosphate, Acid. See Calcium phosphate, monobasic.

Calcium Phosphate, Bibasic. See Calcium phosphate, dibasic.

Calcium Phosphate, Dibasic (Dicalcium ortho-phosphate; Bicalcic phosphate; Secondary calcium phosphate; Bibasic calcium phosphate) $CaHPO_4.2H_2O$.
Color and properties: White, crystalline powder.
Constants: Sp.gr. 2.306; m.p.: Decomposes.
Soluble in acid; insoluble in water and alcohol.
Derivation: By the interaction of solutions of a calcium salt and sodium diphosphate.
Grades: Technical; C.P.
Containers: Tins; boxes; glass bottles.
Uses: Medicine; dentistry; leavening agent in baking.
Railroad shipping regulations: None.*

Calcium Phosphate, Monobasic (Calcium biphosphate; Acid calcium phosphate; Calcium phosphate, primary; Monocalcium phosphate) $CaH_4(PO_4)_2.H_2O$.
Color and properties: Colorless, pearly scales; deliquescent in air.
Constants: M.p.: Loses H_2O at 100°C., decomposes at 200°C.
Soluble in water and acids.
Derivation: By dissolving either dicalcium or tricalcium phosphates in phosphoric acid and allowing the solution to evaporate spontaneously.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. kegs.
Railroad shipping regulations: None.*

Calcium Phosphate, Precipitated. See Calcium phosphate, tribasic.

Calcium Phosphate, Primary. See Calcium phosphate, monobasic.

Calcium Phosphate, Secondary. See Calcium phosphate, dibasic.

Calcium Phosphate, Tertiary. See Calcium phosphate, tribasic.

Calcium Phosphate, Tribasic (Calcium ortho-phosphate; Tricalcium phosphate; Precipitated calcium phosphate; Tricalcium ortho-phosphate; Tricalcic phosphate; Tertiary calcium phosphate) $Ca_3(PO_4)_2$.
Color and properties: The precipitated product is a white, amorphous powder.
Constants: Sp.gr. 3.18; m.p. 1,550°C.
Soluble in acids; insoluble in water.
Derivation: Found abundantly in nature as phosphate rock, apatite, and phosphorite. By the

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

interaction of solutions of calcium chloride and sodium triphosphate with excess of ammonia.
Grades: Technical; C.P.; N.F.
Containers: Glass bottles; wooden kegs.
Uses: Ceramics (porcelains, potteries, enamels, milk glass); calcium acid phosphate; polishing powder; cattle foods; clarifying sugar syrups; medicine (food); rubber; mordant (dyeing textiles with Turkey red).
Railroad shipping regulations: None.*

Calcium Phosphide (Photophor) Ca_2P_2.
Color and properties: Gray masses; decomposes on contact with water generating hydrogen phosphide, which takes fire in air.
Constants: Sp.gr. 2.51.
Insoluble in alcohol and ether.
Derivation: By heating calcium phosphate and aluminum.
Grades: Technical.
Containers: Iron canisters.
Uses: Signal fires.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Calcium Resinate $Ca(C_{44}H_{62}O_4)_2$.
Color and properties: Yellowish-white, amorphous powder.
Soluble in acid; insoluble in water.
Derivation: By boiling calcium hydroxide with rosin and filtering.
Grades: Technical.
Containers: Wooden barrels.
Uses: Waterproofing; manufacturing paint driers.
Railroad shipping regulations: None.*

Calcium Salicylate (Basic calcium salicylate) $CaC_7H_5O_3.H_2O$.
Color and properties: Sandy white powder.
Insoluble in water. The neutral salt is soluble in water.
Uses: Medicine (diarrhea and gastro-enteritis).
Railroad shipping regulations: None.*

Calcium Salicylate, Basic. See Calcium salicylate.

Calcium Silicofluoride $CaSiF_6$.
Color and properties: White, crystalline powder.
Constants: Sp.gr. 2.662.
Very slightly soluble in water.
Derivation: By the action hydrosilicofluoric acid on calcium carbonate and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Ceramics.
Railroad shipping regulations: None.*

Calcium Stearate $Ca(C_{18}H_{35}O_2)_2$.
Color and properties: White powder.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of sodium stearate and calcium chloride and filtration.
Grades: Technical.
Containers: Wooden barrels.
Uses: Waterproofing.
Railroad shipping regulations: None.*

Calcium Sulfate (a) $CaSO_4$ (anhydrite); (b) $CaSO_4.2H_2O$ (gypsum); (c) $(CaSO_4)_2.H_2O$ (plaster of Paris).
Color and properties: White powder.
Constants: Sp.gr.: (a) 2.964, (b) 2.32; m.p.: (a) 1,360°C.
Insoluble in water.
Derivation: (a) Found in large quantities in nature. (b) Occurs in granular masses and as gypsum (q.v.), a perfectly crystallized form. (a and b) By-product in many industrial operations. (c) See plaster of Paris.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. kegs; bags; barrels; freight cars.
Uses: Interior decoration (stucco); polishing powder; artificial ivory; cements (especially "Keene's cement," also as a retarder); paints (white pigment, filler, drier); paper (size, filler, surface-coating); dyeing and calico printing; metallurgy (reduction of zinc minerals); agriculture (as such and in compounds used to correct soils poor in calcium,—acid soils); chemicals (sulfuric acid, ammonium sulfate, sodium hyposulfite); brewing; baking powders, self-raising flours.
Railroad shipping regulations: None.*

Calcium Sulfide (Calcic liver of sulfur; Heparcalcis) CaS.
Color and properties: Light gray cubes.
Constants: Sp.gr. 2.8.
Soluble in acids; slightly soluble in water.
Derivation: By strongly heating pulverized calcium sulfate and charcoal.
Grades: Technical; U.S.P.
Containers: 1 lb. bottles; iron barrels.
Uses: Luminous paint; medicine; depilatory; preparation of arsenic-free hydrogen sulfide.
Railroad shipping regulations: None.*

Calcium Sulfide, Crude. See Lime, sulfurated.

Calcium Sulfite $CaSO_3.2H_2O$.
Color and properties: White powder.
Soluble in sulfurous acid; slightly soluble in water.
Derivation: By the action of sulfurous acid on calcium carbonate.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; iron drums.
Uses: Textiles (antichlor); disinfectant in sugar industry, brewing; biological cleansing; food preservative and discoloration retarder; paper manufacture.
Railroad shipping regulations: None.*

Calcium Sulfocarbolate. See Calcium phenolsulfonate.

Calcium Sulfophenate. See Calcium phenolsulfonate.

Calcium Sulfophenylate. See Calcium phenolsulfonate.

Calcium Superoxide. See Calcium peroxide.

Calcium Tartrate $CaC_4H_4O_6.H_2O$.
Color and properties: White, crystalline powder.
Soluble in acids; insoluble in water.
Derivation: By the interaction of a calcium salt and crude cream of tartar.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Tartaric acid.
Railroad shipping regulations: None.*

Calcium Tungstate (Calcium ortho-tungstate; Calcium wolframate) $CaWO_4$.
Color and properties: Shining, crystalline scales.
Constants: Sp.gr. 6.062.
Soluble in ammonium chloride; insoluble in water.
Derivation: By the interaction of calcium chloride and sodium tungstate.
Grades: Technical.
Containers: Wooden barrels.
Uses: Luminous paint.
Railroad shipping regulations: None.*

Calcium Urea Nitrate. See Calurea.

Calcium Wolframate. See Calcium tungstate.

Calco-uranite. See Autunite.

Calcspar. See Calcite.

Caledonite. A green basic sulfate of lead and copper of uncertain composition. Found in California.

Calendula (Marigold; Mary-bud; Goldbloom).
Dried florets of Calendula officinalis.
Habitat: Southern Europe and Levant; cultivated everywhere.
Grades: Technical; N.F.
Containers: Boxes.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Coloring butter; adulterant for saffron.
Railroad shipping regulations: None.*

Calendulin. An amorphous, tasteless substance contained in marigold flowers (calendula) which swells in water and is considered analogous to bassorin, though soluble in alcohol.

Caliche (Chilean niter; Chilean nitrate; Chilean saltpeter; Chile niter; Chile saltpeter; Chili niter; Chili nitrate; Chili saltpeter; Cubic niter; Cubic saltpeter; Soda niter; Soda saltpeter). Crude sodium nitrate found in northern Chile.

It contains from 15 to 80% sodium nitrate, up to 55% sodium chloride, varying small amounts of sodium sulfate, calcium chloride, potassium iodide, aluminum sulfate, magnesium sulfate, etc. Two of the well-worked deposits contain respectively: sodium nitrate 21%, sodium chloride 55%; and sodium nitrate 51%, sodium chloride 26%. For the refined products see sodium nitrate.

Californite. A compact massive variety of vesuvianite (q.v.) found in California. Color, bright to yellowish-green or white. Takes a high polish and is used as a gem stone and an ornamental stone.

Calioben. See Calcium iodobehenate.

Calisaya Bark. See Cinchona bark, calisaya.

Calmus. See Calamus.

Calomel. For the commercial product see Mercurous chloride.

Calomel, Colloidal. See Calomelol.

Calomel, Native (Horn mercury; Horn quicksilver) Hg_2Cl_2.
White, yellowish-gray, yellowish-white, gray or brown mineral, adamantine luster, pale yellowish-white streak. Of the consistency of horn, very sectile. Found as a coating in cavities with or near cinnabar. Contains 84.9% mercury. Soluble in aqua regia.
Constants: Sp.gr. 6.48; hardness 1 to 2.
Occurrence: United States (Texas), Servia, Mexico, Germany, Austria, Spain.
Uses: Not an important source of mercury.

Calomel, Soluble. See Calomelol.

Calomelol (Colloidal calomel; Soluble calomel).
Color and properties: Whitish-gray, odorless, tasteless powder.
Soluble in water, alcohol, ether and benzene.
Derivation: 80% calomel and 20% albuminoids.
Grades: Technical.
Containers: Boxes.
Uses: Medicine (syphilis, unofficial).
Railroad shipping regulations: None.*

Calorizing. Process whereby aluminum is driven into the surface of steel to form an iron-aluminum alloy. This alloy is immune to oxidation up to metal temperatures of 1,650°F. and entirely resistant to the corrosive attack of gaseous sulfur compounds occurring in products of combustion.

Unlike electro-plated material or the coated product which is obtained by such processes as hot-dip galvanizing, calorized steel does not obtain immunity to oxidation and corrosion by virtue of a superimposed layer of metal. The iron-aluminum alloy becomes an integral part of the base metal but is much harder than the central core of mild steel. The resulting product is one having all the advantages of mild steel, strength, ductility and low initial cost as well as the added advantages of resistance to oxidation and corrosion.

Single-calorized material has an alloy surface of approximately 0.008" deep while the double calorized product has an alloy surface of approximately 0.014" deep. Double-calorized steel is recommended for a somewhat higher temperature than the single-calorized product, viz., 1,800°F.

Calorized steel is claimed to be the most economical heat-enduring material obtainable and successfully replaces nickel-chromium alloys for applications within the recommended operating temperature. Representative applications are as follows: Tubing for oil stills; condenser tubes; heat exchanger tubes; pyrometer protection tubes; burner nozzles; dampers and damper frames; baffles; bolts and nuts; annealing pots; retorts; pipe and fittings.

Calumba (Columbo; Jateorhiza).
Derivation: Root of Jateorhiza palmata.
Habitat: Eastern Africa.
Grades: Technical; U.S.P.
Containers: Bales.
Uses: Medicine (for its alkaloid content).
Railroad shipping regulations: None.*

Calurea (Calcium urea nitrate).
A proprietary brand of nitrogen fertilizer prepared from German synthetic ammonia. It is a white finely crystalline, somewhat granular salt stated to contain 34% nitrogen, one-fifth of which is in the nitrate form and four-fifths in the amine (organic) form. It is stated to keep indefinitely if stored in a dry place.
Soluble in water.
Derivation: By solution mix of calcium nitrate and urea in the molecular equivalents of 1 to 4.
Railroad shipping regulations: None.*

Calx, U.S.P. See Calcium oxide.

Calx Chlorinata, U.S.P. See Calcium hypochlorite.

Calx Sulfurata. See Lime, sulfurated.

Cam Wood (Cambe wood).
Wood from a variety of the tree Baphia nitida.
Habitat: West coast of Africa.
Uses: For its red dye which gives deeper shades than those of other woods and is more soluble.

Cambe Wood. See Cam wood.

Cambogia, U.S.P. See Gamboge.

Camganiba. See Manaca.

Camomile Oil. See Chamomile oil, German.

Camphene $C_{10}H_{16}$.
Color and properties: Colorless crystals.
Constants: Sp.gr. 0.8446; m.p. 49.5°C.; b.p. 157°C.
Soluble in ether; slightly soluble in alcohol; insoluble in water.
Derivation: (a) By heating pinene hydrochloride with alkalis, aniline or alkali salts, such as sodium acetate. (b) A constituent of certain essential oils.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Medicine; manufacture of synthetic camphor; camphor substitute.
Railroad shipping regulations: None.*

Camphor (Gum camphor; Formosa camphor; Japan camphor; Laurel camphor) $C_9H_{16}CO$.
Color and properties: White, translucent masses, easily broken.
Constants: Sp.gr. 0.986 to 0.996; m.p. 175°C.; b.p.: Sublimes at 204°C.
Soluble in alcohol, ether, chloroform, carbon bisulfide, petroleum, benzine, fixed and volatile oils.
Derivation: From the wood of the camphor laurel tree (Cinnamomum camphora), native in Japan, China, and Formosa, by distillation. Camphor is now also cultivated on a commercial scale in Florida. Also made synthetically.
Method of purification: Recrystallization and sublimation.
Grades: Crude; refined; synthetic; U.S.P.
Containers: Imported: 1 lb. tins in 100 lb. cases (tablets of various sizes); 100 lb. cases

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

(2½ lb. slabs); domestic: 1 lb. cartons (½, 1, 4 oz. tablets); 100 lb. cases (1 lb. tins); 250 lb. barrels.

Uses: Medicine (hysteria, headaches, nose and throat diseases, heart stimulant); celluloid; pyrotechnics; tooth powder; lacquers; moth preventive; photographic films; enbalming; insecticidal preparations; sweetmeats; explosives.

Railroad shipping regulations: None.*

Camphor, Alant. See Helenin.

Camphor, Artificial. See Terpene hydrochloride.

Camphor, Baras. See Borneol.

Camphor, Benzoated.

Derivation: Mixture of benzoic acid and camphor.

Color and properties: White powder.

Soluble in alcohol, ether and chloroform.

Grades: Technical.

Containers: Tins.

Uses: Medicine.

Railroad shipping regulations: None.*

Camphor, Bitter Almond Oil. See Benzoin.

Camphor, Borneo. See Borneol.

Camphor Bromate (Bromocamphor; Brominated Camphor; Camphor monobromate) $C_{10}H_{15}BrO$.

Color and properties: Colorless crystals.

Constants: M.p. 76°C.; b.p. 274°C.

Soluble in alcohol, ether, chloroform and oils; insoluble in water.

Derivation: By heating camphor with bromine.

Method of purification: Crystallization.

Grades: Technical; U.S.P.

Containers: 1 lb. bottles; 5, 25 lb. boxes; 100 lb. kegs; 100, 112 lb. cases; 200 lb. barrels.

Uses: Medicine.

Railroad shipping regulations: None.*

Camphor, Bromated. See Camphor Bromate.

Camphor, Brominated. See Camphor Bromate.

Camphor, Cantharides. See Cantharidin.

Camphor, Elecampane. See Helenin.

Camphor, Formosa. See Camphor.

Camphor, Gum. See Camphor.

Camphor Ice. Camphor incorporated with paraffin.

Camphor, Inula. See Helenin.

Camphor, Japan. See Camphor.

Camphor, Laurel. See Camphor.

Camphor, Liquid. See Camphor oil.

Camphor, Malayan. See Borneol.

Camphor Monobromate. See Camphor Bromate.

Camphor Oil (Camphorated oil; Camphor, liquid).

An oil produced by the distillation of camphor wood. The original oil contains considerable camphor which is removed first by filtration and cooling and later by a second step of fractionation and cooling. The valuation of camphor oil is based on specific gravity.

Chief known constituents: Acetaldehyde, pinene, camphene, fenchene, phellandrene, cineole, dipentene, limonene, borneol, camphor, terpinenol, terpineol, citronellol, safrole, menthenone, carvacrol, cuminic alcohol, eugenol, cadinene.

The different varieties are as follows:

Crude oil. The oil from which the crystallized camphor has been removed. It is usually fractionated in Japan and split into white oil, red oil and camphor. Light yellow to brownish-yellow color; camphor odor. Sp.gr. 0.95 to 0.995; optical rotation dextrogyrate.

White oil. The lowest boiling portions; it consists principally of terpenes and small quantities of cineole; camphor odor. Sp.gr. 0.87 to 0.91; optical rotation dextrogyrate.

Red (black) oil. That portion of the oil boiling higher than camphor; contains safrole, phenols and sesquiterpenes; camphor odor. Sp.gr. 1.000 to 1.035 (usually); optical rotation dextrogyrate. The white and the red (black) oil are subsequently fractionated in the United States and Europe yielding safrole, light, heavy, and blue camphor oils.

Light oil. The low-boiling portion. Sp.gr. 0.86 to 0.900; b.p. 175 to 200°C. (and above); flash point 45° to 60°C. Used as a substitute for turpentine oil in varnish manufacture and for cleaning type, electroplates and cylinders in the printing industry.

Heavy oil. The high-boiling portion. Sp.gr. about 0.95 at 15°C.; b.p. 270° to 300°C. Used in varnish manufacture; perfuming cheap soaps, especially soft soaps; shoe polish; hoof ointments; and hiding the odor of mineral oils, wagon greases and lubricating oils.

Blue oil. Sp.gr. (about) 0.95 to 0.96; b.p. (about) 300°C. Used similarly to heavy oil.

Railroad shipping regulations: None.*

Camphor, Parsley. See Apiole.

Camphor, Peppermint. See Menthol.

Camphor, Pulsatilla. See Anemonin.

Camphor, Sumatra. See Borneol.

Camphor, Synthetic.

A term used to distinguish the manufactured product from "artificial camphor" or pinene hydrochloride. Natural and synthetic camphor differ in their action on polarized light but it has been claimed that some synthetic camphors have the rotation of the natural product.

Derivation: (a) Camphene is converted to isoborneol, which is oxidized to camphor. (b) Decomposition of isobornyl acetate by alcoholic potash. (c) Oxidation of camphene direct to camphor. (d) Conversion of pinene hydrochloride direct to camphor by heating with nitric acid or its salts in presence of a catalyst. There is a large number of patents on the subject.

Uses: See Camphor.

Camphor, Tonka Bean. See Coumarin.

Camphorated Oil. See Camphor oil.

Camphoric Acid $C_8H_{14}(CO_2H)_2$.

Color and properties: Colorless, odorless needles or scales.

Constants: Sp.gr. 1.228; m.p. 208°C.

Soluble in alcohol, ether and fatty oils.

Derivation: By oxidizing camphor with nitric acid.

Method of purification: Crystallization.

Grades: Technical; U.S.P.

Containers: 1 oz. vials; ¼, 1, 5 lb. bottles; 5 lb. cans.

Uses: Celluloid; pharmaceuticals (drug preparations, salts and esters of pharmaceutical importance).

Railroad shipping regulations: None.*

Canada Pitch (Hemlock pitch).

Color and properties: Dark reddish-brown pitch; hard and brittle and becomes darker in color on exposure to air. Sometimes erroneously termed hemlock gum.

Constants: Softens at slightly above room temperature, melts at 92.2°C.

Derivation: The resinous exudation from the Tsuga canadensis, hemlock or hemlock spruce.

Uses: Medicine (rubefacient).

Railroad shipping regulations: None.*

Canada Snake Root. See Asarum.

Canada Snake-root Oil. See Asarum canadense oil.

Canada Turpentine. See Canada balsam.

Canadian Asarabacca Oil. See Asarum canadense oil.

Canadian Hemp. See Apocynum.

Canadol. See Petroleum ether.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Cananga Oil. See Ylang ylang oil.

Canarium. See Gum elemi.

Candelilla Wax.
Color and properties: Yellowish-brown, opaque to translucent solid wax.
Constants: Sp.gr. 0.983; m.p. 67° to 68°C.; saponification value 65; iodine number 37; refractive index 1.4555.
Soluble in chloroform and turpentine.
Derivation: Found coating the entire surface of the wild candelilla plant of Mexico from which it is obtained by immersing the plant in boiling water, and skimming off the wax which rises to the surface of the water.
Method of purification: Treatment with sulfuric acid or niter cake.
Impurities: Bark fragments, etc.
Grades: Technical.
Containers: Bags; boxes.
Uses: Leather dressing; furniture polishes; shoe polishes; candle manufacture; cements; varnishes; substitute for carnauba wax and beeswax; electrical insulating compositions; sealing wax; phonograph records; waterproofing and insect-proofing containers; paint removers; dentistry; paper sizes; celluloid (camphor substitute); rubber and rubber substitutes; stiffener for soft waxes.
Railroad shipping regulations: None.*

Candleberry. See Myrica.

Candle-nut Oil. See Lumbang oil.

Candle Pitch. See Stearin and fatty acid pitches.

Candle-tar Pitch. See Stearin and fatty acid pitches.

Cane Blackstrap. See Molasses.

Cane Sugar. See Sugar, cane.

Canella (White cinnamon; Cinnamon bark; White wood bark; False winter's bark; Bahama white wood; Wild canilla).
Derivation: Bark of Canella winterana or C. alba.
Habitat: West Indies and Florida.
Grades: Technical; N.F. (C. alba).
Containers: Bales.
Uses: Medicine (aromatic tonic prescribed in combination); condiment; addition to smoking tobacco.
Railroad shipping regulations: None.*

Canella Oil.
Color and properties: Colorless oil; spicy odor and taste.
Chief known constituents: Eugenol; cineole; caryophyllene.
Constants: Sp.gr. 0.920 to 0.935; optical rotation +1° 8′.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the bark of Canella alba.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine; perfume.
Railroad shipping regulations: None.*

Canna (Common canna; Indian shot; Tous-les-mois).
Derivation: Root of Canna indica.
Habitat: Europe; widely distributed in the tropics.
Grades: Technical.
Containers: Bales.
Uses: Medicine; source of starch.
Railroad shipping regulations: None.*

Cannabin Resin. See Cannabis indica.

Cannabis Indica (Cannabin resin; Indian hemp; Indian cannabis; Guaza).
Derivation: Dried flowering tops of Cannabis sativa, gathered while yet undeveloped and carrying the whole of their natural resin.
Habitat: Persia, East India; cultivated in Europe, Asia and western United States.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (to relieve pain, encourage sleep and soothe restlessness); corn removers.
Railroad shipping regulations: None.*

Cannel Coal (Parrot coal; Jet coal).
A coal formerly much used for gas making and for distillation for oil. It is very high in volatile matter and hydrogen. Owing to its characteristics some difficulty is experienced in classifying cannel coal. The following classification is suggested in United States Geological Survey Bulletin 659:
(1) Subcannel coal:
(a) Brown subcannel, or brown coal of lignite rank.
(b) Black subcannel, of subbituminous rank.
(2) Cannel coal, of bituminous rank:
(a) Boghead cannel (fuel ratio less than 0.5).
(b) Typical cannel (fuel ratio between 0.5 and 1).
(c) Lean cannel or semicannel (fuel ratio more than 1).
(3) Canneloid, semibituminous coal, semi-anthracite, or anthracite.

Cantharidal Collodion. See Collodion, blistering.

Cantharides (Blistering flies; Cantharis; Blistering beetle).
The species of most commercial importance are Cantharis vesicatoria and Mylabris cichorii.
Habitat: Cantharis vesicatoria (usually known as Spanish blistering flies or by the name of the country from which derived), Spain, Russia, Hungary, Sicily, Poland, Rumania; Mylabris cichorii, China; Cantharis vittata, United States; Cantharis quadrimaculatus, Mexico; Mylabris lunata, South Africa; Epicauta gorhami, Japan; Lytta aspersa, Argentine.
Grades: U.S.P., either whole or powdered.
Containers: Boxes; cases.
Uses: Medicine (externally as a blistering agent, use internally as an irritant now abandoned).
Railroad shipping regulations: None.*

Cantharidin (Cantharides camphor; Lactone of cantharidic acid) $C_{10}H_{12}O_4$.
Color and properties: Colorless, crystalline scales.
Constants: M.p. 218°C.
Very slightly soluble in water and alcohol; slightly soluble in chloroform, acetone, acetic ether; soluble in fixed oils.
Derivation: From Cantharis vesicatoria.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Same as Cantharides.
Railroad shipping regulations: None.*

Cantharis. See Cantharides.

Caoutchouc (Rubber; India rubber; Elastica).
Color and properties: Light cream to dark amber, amorphous, elastic, dry loaves, sheets or slabs, consisting of caoutchouc, resins, proteins, mineral matter and fibrous insoluble matter.
Constants: Sp.gr. about 0.9.
Soluble in carbon bisulfide, petroleum and coal-tar hydrocarbons, particularly solvent naphtha, chlorinated hydrocarbons and essential oils.
Derivation: By coagulation of the latex of various trees and shrubs, followed by washing and smoking.
Impurities: Sand, stones, twigs, bark, etc.
Manufacture: Crude rubber rapidly loses its valuable mechanical properties, therefore, it is vulcanized, i.e., mixed with sulfur and heated.
Grades: Hard rubber or ebonite; semi-soft or elastic. Rubber is graded according to the localities from which it is obtained, the best being "Para," which shows the lowest loss on

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

washing and the smallest amount of insoluble matter. Other grades are "Negro heads," "Congo," "Assam," etc.
Containers: Barrels; wooden boxes.
Uses: Electric insulation; elastic bands and webbing; combs; pen-holders; foot-wear; brush and other handles; fountain pens; toys; gas and water hose; containers; vehicle tires; belting; etc.
Railroad shipping regulations: None.*

Caoutchouc Lubricants. Melted caoutchouc with which linseed oil is gradually incorporated until the whole represents 20 parts of caoutchouc and 1,000 parts of linseed oil.

Cape Gum. See Arabic gum.

Capivi Balsam. See Copaiba.

Capric Ether. See Ethyl caprate.

Caprilic Acid. See Caprylic acid.

Caprinic Ether. See Ethyl caprate.

Caproic Acid (Capronic acid; Hexylic acid; Hexoic acid; Pentylformic acid; Pentiformic acid). $C_5H_{11}COOH$.
Color and properties: Oily, colorless liquid; odor of Limburger cheese.
Constants: Sp.gr. 0.922; m.p. —5.2°C.; b.p. 205°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From crude fermentation butyric acid by fractional distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 5, 10 lb. glass bottles.
Uses: Analytical chemistry; chemical esters; artificial essence of pineapple.
Railroad shipping regulations: None.*

Caproic Ether. See Ethyl caproate.

Capronic Acid. See Caproic acid.

Capronic Ether. See Ethyl caproate.

Caproyl Hydride. See Hexane.

Capryl Alcohol. See Caprylic alcohol.

Caprylic Acid (Octylic acid; Octic acid; Caprilic acid) $C_7H_{15}COOH$.
Color and properties: Colorless liquid; crystallizing below 17°C.
Constants: Sp.gr. 0.9185; m.p. 17°C.; b.p. 235° to 237°C.
Soluble in water, alcohol and ether.
Derivation: By saponification and subsequent distillation of coco-nut oil.
Method of purification: Crystallization or rectification.
Grades: Technical.
Containers: Cans; glass bottles.
Uses: Synthesis of various dyes, drugs and perfumes.
Railroad shipping regulations: None.*

Caprylic Alcohol (Capryl alcohol; Secondary octylic alcohol; Octoic alcohol) $CH_3(CH_2)_5CHOHCH_3$.
Color and properties: Colorless oily liquid; pungent aromatic odor.
Constants: Sp.gr. 0.832; b.p. 179°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) Normal caprylic alcohol as the butyrate is the chief constituent of parsley oil. (b) Secondary caprylic alcohol (methylhexylcarbinol) is obtained by distilling castor oil with an excess of caustic alkali.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Caprylic Aldehyde (Caprilic aldehyde; Octoic aldehyde; Octylic aldehyde) $C_7H_{15}CHO$.
Color and properties: Colorless liquid; pungent odor.
Constants: Sp.gr. 0.819; m.p. —16°C.; b.p. 154°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: By destructive distillation of castor oil.
Method of purification: Through its compound with sodium bisulfite.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Caprylic Ether. See Ethyl caprylate.

Capsicin. The active principle of capsicum (pepper) (q.v.).

Capsicum (Cayenne pepper; African pepper; Chillies; Bird pepper; Red pepper).
Derivation: Dried ripe fruit of Capsicum frutescens.
Habitat: Southern India; cultivated extensively in the tropics.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (powerful local stimulant); condiment.
Railroad shipping regulations: None.*

Caput Mortuum. Similar to Venetian red (q.v.).

Car Oils, Railroad. See Axle oils, railroad.

Caraccas Kino (South American kino).
Color and properties: Similar in appearance and properties to West India kino (q.v.). The only apparent difference between the two is that the Caraccas kino lacks a minute proportion of resinous matter.
Soluble in water (93.5%) and alcohol (93%).
Uses: Medicine [similar to West India kino, (q.v.)].

Caramania Gum. One of the bassora gums (q.v.).

Caramel (Sugar coloring; Burnt sugar).
Color and properties: Dark-brown, deliquescent mass or semi-solid; bitter taste.
Derivation: Obtained by carefully heating sugar.
Soluble in water.
Grades: Technical; N.F.; also sold in solution.
Containers: 5 gal. cans; 45-50 gal. barrels.
Uses: Coloring foods, confectionery, sweetmeats, vinegar, liqueurs, malt beverages; tobacco flavoring.
Railroad shipping regulations: None.*

Caraway (Carum).
Derivation: Dried seed of biennial herb, Carum carvi.
Habitat: Europe, central and western Asia; cultivated in England, Russia and United States.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine (carminative); flavoring; liqueurs; condiment.
Railroad shipping regulations: None.*

Caraway Oil (Caraway-seed oil; Carui oil).
Color and properties: Colorless or pale yellow, thin, liquid; characteristic odor; mild, spicy taste. Carvone content: 50 to 60%.
Chief known constituents: Carvone and dextrolimonene.
Constants: Sp.gr. 0.907 to 0.915; b.p. 175° to 230°C.; optical rotation +70° to +85°; refractive index 1.4867 to 1.4970.
Solubility in alcohol: Sparingly in 70% alcohol; in 2 to 10 vols. of 80% alcohol; in equal vols. of 90% alcohol.
Derivation: Distilled from caraway seed.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: U.S.P.: 1, 5 lb. bottles; 25 lb. tins; technical: 10, 55 gal. drums.
Uses: Medicine; flavoring.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Caraway Oil, Terpeneless.
Concentration: About 2 times that of the ordinary caraway oil.
Constants: Sp.gr. 0.963 to 0.965; optical rotation +58°.
Solubility in alcohol: 25 vols. in 100 vols. of 60% alcohol; 60 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Caraway-seed Oil. See Caraway oil.

Carbamide. See Urea.

Carbamide Carbonate. Guanidine carbonate.

Carbamilic Ether. See Ethylphenylcarbamate.

Carbanilide. See Diphenylurea.

Carbapatite. See Apatite.

Carbazole (Diphenylimide; Iminodiphenyl) $(C_6H_4)_2NH$.
Color and properties: White to reddish-white crystals.
Constants: M.p. 238°C.; b.p. 351.5°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From crude anthracene cake by selective solution of the phenanthrene with crude solvent naphtha, removal of the anthracene by conversion into a sulfonic derivative and extraction by means of water.
Grades: Technical.
Containers: 220, 350 lb. barrels.
Uses: Starting point in manufacture of hydron blue and various intermediates.
Railroad shipping regulations: None.*

Carbazotic Acid. See Picric acid.

Carbethoxyvanillylidene-para-phenetidine. See Eupyrine.

"Carbide." See Calcium carbide.

Carbinol. See Methyl alcohol.

Carbitol (Diethylene glycol ethyl ether) $CH_2OHCH_2OCH_2CH_2OC_2H_5$.
Color and properties: Slightly yellowish liquid; mild odor; slightly viscous.
Constants: B.p. 198°C.; weight per gal. 8.3 lbs. at 15.6°C.
Soluble in water.
Grades: Technical.
Containers: 5, 10, 55, 110 gal. drums; net contents 40, 80, 425, 850 lbs.
Uses: Solvent for dyes, nitrocellulose and resins; textile printing; pyroxylin dope and plastics; textile soaps; safety glass.
Railroad shipping regulations: None.*

Carbocoal.
Color and properties: Grayish-black, dustless briquettes, slightly resembling coke, but with a density more nearly approaching that of anthracite.
Derivation: A low-temperature-carbonization fuel produced by distilling coal at a low temperature (850° to 900°F.), mixing the residue with pitch and distilling at a higher temperature (1,800°F.).
Sizes: 1 to 5 ozs.
Uses: Fuel.
Railroad shipping regulations: None.*

"Carbofrax." A registered proprietary name for bonded silicon carbide.
Physical characteristics: Black with a red glaze; brick, smooth even texture, highly impervious; weight per cu. ft. 153 lbs.; porosity 14 to 20%; pyrometric cone equivalent —39 plus. Thermal conductivity 110 B.t.u. per sq. ft. per inch thick per degree F. per hour.
Refractory product.
Derivation: Bonded silicon carbide grain, kiln fired.
Grades: Brick and shapes of all kinds.
Containers: Crates.
Uses: Linings for boiler furnaces; enamelling muffles; etc.
Railroad shipping regulations: None.*

Carbofuchsin (Carbolfuchsin). A solution of fuchsin in dehydrated alcohol, used as a stain in the study of microörganisms.

Carbolfuchsin. See Carbofuchsin.

Carbolic Acid. See Phenol.

Carbo Ligni, U.S.P. See Charcoal, wood.

Carbolineum. A proprietary name for a heavy coal-tar oil from which the anthracene, etc., has been removed. Used as a timber preservative and also as an antiseptic.

Carbolon. Trade name for an abrasive.

Carbon C.
Found in nature in many forms, the purest of which are diamond and graphite. All organic compounds contain carbon. Amorphous forms are charcoal, lampblack, animal charcoal, coal, coke, all of which are impure carbon.

Carbon, Active. See Activated charcoal.

Carbon Bichloride. See Tetrachloroethylene.

Carbon Bisulfide (Carbon disulfide) CS_2.
Color and properties: Clear, colorless, inflammable liquid; almost odorless when pure; the commercial article has a strong disagreeable odor; poisonous!
Constants: Sp.gr. 1.2927; m.p. —111.6°C.; b.p. 46.25°C.; flash point (observed) —25.5° to —20°C., (calculated), min., —27°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: (a) By the action of sulfur vapors on red-hot carbon, the vapors formed being condensed. (b) By heating sulfur and carbon in an electric furnace and condensing the carbon bisulfide vapors.
Method of purification: Treatment with lead acetate followed by lime water with subsequent distillation.
Impurities: Sulfur compounds.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 5, 10, 55 gal. drums; tank cars.
Uses: Solvent; varnishes; matches; preservative; insecticide; manufacture of carbon tetrachloride.
Fire hazard: Dangerous.*
Railroad shipping regulations: Cannot be shipped by express; red label by freight.

Carbon Black. See under Blacks.

Carbon, Combined.
Carbon which has combined with iron in pig iron or steel to form cementite (q.v.). See also Carbon, graphite; Pearlite; Ferrite.

Carbon, Decolorizing. See Activated charcoal; Blacks; Blood charcoal.

Carbon, Deodorizing. See Activated charcoal; Blacks; Blood charcoal.

Carbon Dichloride. See Tetrachloroethylene.

Carbon Dioxide (Carbonic acid) CO_2.
Color and properties: Colorless, odorless gas or heavy, volatile, colorless liquid or white snow-like solid.
Constants: Gas: Sp.gr. 1.53. Liquid: Sp.gr. 1.057; m.p. —65°C.; b.p. —78.2°C. Solid: Sp.gr. 1.56.
Soluble in water.
Derivation: Combustion of carbon in any form with an excess of oxygen; fermentation (e.g. in breweries); or by action of acids on marble, limestone or dolomite. The gas is purified, collected and subjected to pressure.
Grades: Technical.
Containers: When liquid, 20, 50 lb. steel cylinders.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Chemicals (soda ash and bicarbonate manufacture by Solvay process, carbonates, antoxidant, digestion of oxidizable substances, drying agent, ammonium carbonate, ammonium sulfate by the lime process, barium carbonate from the sulfide, hydrocyanic acid, salicylic acid, precipitation of aluminum hydroxide, distillation of phosphorus compounds, organic synthesis); logwood extraction (antoxidant); rubber analysis; agriculture (insecticide, fungicide, germicide, plant food, storing and shipping apples, grapes, grain and other crops); brewing; pyrotechnics; food (baking industry); protection of flavor and vitamins in fruit juices and extracts; butter manufacture; milk industry; ice cream industry; removal of sulfur dioxide from foods bleached with that gas; antiseptic preservative; prevention of dust explosions in milling cereals; soft drinks; glue and gelatin manufacture; metallurgy (preventing blowholes in large steel castings, cementation process); torpedo propellant; fire extinguisher and explosion preventative; petroleum refining; medicine (local anesthetic, carbonated baths); safety refrigerant; rubber manufacture; disinfectant soaps; sugar manufacture; boiling out cotton and woolen textiles; solvent recovery; railroad signals.

Railroad shipping regulations: Green gas label.

Carbon Disulfide. See Carbon bisulfide.

Carbon, Gas (Retort carbon; Retort graphite; Metallic carbon; Glance coal).

Carbon, in a very dense form, found deposited in the upper parts of retorts used in coal-gas manufacture. A similar form is also found deposited in blast furnaces. It is very hard, conducts heat and electricity well, and often has the luster and sonority of a metal.

Uses: Graphite crucibles, carbon electrodes, etc.

Carbon, Graphitic.

Practically pure carbon which forms in pig iron during the cooling process, because the absorbing power of iron for carbon decreases as its temperature falls. It exists in the iron in the form of tiny flakes which are distributed throughout the mass. Graphitic carbon gives pig iron the grayish-black appearance so often seen. The tendency of graphitic carbon is to weaken the metal, while combined carbon (q.v.) up to the limit of about 0.90% strengthens it. See also Pearlite; Cementite; Ferrite.

Carbon Hexachloride. See Carbon trichloride.

Carbon, Metallic. See Carbon, gas.

Carbon, Mineral. See Graphite.

Carbon Monoxide CO.

Color and properties: Colorless gas, metallic odor and taste, highly poisonous, inducing asphyxiation; 0.2% in air is poisonous and 0.43% will induce asphyxiation.

Constants: Sp.gr. 0.96716; b.p. −190°C.

Derivation: (a) Obtained almost pure by introducing a mixture of oxygen and carbon dioxide in contact with incandescent graphite, coke or anthracite. (b) Action of steam on hot coke or coal (water gas). (c) By-product in chemical reactions. (d) Combustion of organic compounds with limited amount of oxygen.

Absorbed by carbon, some metals and by a solution of cuprous chloride in hydrochloric acid or ammonia.

Railroad shipping regulations: Red gas label.

Carbon, Retort. See Carbon, gas.

Carbon Tetrachloride (Tetrachloromethane; Perchloromethane) CCl_4.

Color and properties: Light, colorless liquid; peculiar odor, yielding heavy vapors; non-inflammable; poisonous!

Constants: Sp.gr. 1.5835; m.p. −22.95°C.; b.p. 76.74°C.

Miscible with alcohol, ether, chloroform, benzene, benzine and most of the fixed and volatile oils; very slightly soluble in water.

Derivation: By the interaction of carbon bisulfide and chlorine in presence of a catalyzer (iodine).

Method of purification: Treatment with caustic alkali solution to remove sulfur chloride, followed by rectification.

Grades: Technical; C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 60, 120, 700, 1,400 lb. iron drums; tank cars.

Uses: Solvent; fire extinguishers; cleaning compounds; chloroform manufacture; chlorinating organic compounds; substitute for oil in electrical transformers and high tension switches; solvent for fats and oils; electroplating; metal polishes; lacquers; extracting perfumes from flowers; paraffin solvent; recovering waxes and resins from raw materials; rubberizing fabrics; rubber cements; manufacture of gelatinous water-soluble soaps from sulfonated oils and resins; degreasing textiles.

Railroad shipping regulations: None.*

Carbon Trichloride (Hexachloroethane; Perchloroethane; Carbon hexachloride; Tetrachloroethylene dichloride) $CCl_3.CCl_3$.

Color and properties: Colorless crystals; camphor-like odor.

Constants: Sp.gr. 1.9988; m.p. 185°C.; b.p. 185°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: By the action of sunshine on chlorine and ethyl and ethylene chlorides.

Method of purification: Crystallization.

Grades: Technical.

Containers: 100, 250, 500 lb. barrels.

Uses: Organic synthesis; explosives; retarding agent in fermentation; antiseptic; camphor substitute in celluloid manufacture; rubber accelerator.

Railroad shipping regulations: None.*

Carbon Wool.

A mass of fine intermingled carbon threads sometimes obtained in coking.

Carbonado. See Diamond.

Carbonic Acid. See Carbon dioxide.

Carbonic Ether. See Ethyl carbonate.

Carbonite.

Native coke. It is more compact than artificial coke. Some varieties contain bitumen.

Carbonites. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
5	C	4
6	C	4
7	C	4

Railroad shipping regulations: High explosive.

"Carbonizer."

Trade name for an aluminum chloride sold both in the liquid and crystal form.

Carbonyl Chloride (Phosgene) $COCl_2$.

Color and properties: Colorless, volatile liquid; extremely poisonous!

Constants: Sp.gr. 1.392; m.p. −75°C.; b.p. 8.2°C.

Derivation: By passing a mixture of carbon monoxide and chlorine through charcoal with or without a catalyst.

Grades: Technical.

Containers: Steel cylinders.

Uses: Lethal gas for warfare; bleaching sand for glass manufacture; chlorinating agent; dye manufacture (methyl violet).

Railroad shipping regulations: Poison gas.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

"Carborundum." Registered proprietary name for silicon carbide and other products.
Color and properties: Green to bluish-black, irridescent, porous, crystalline, sharp-grained platelets or mass.
Constants: Sp.gr. 3.12 to 3.20.
Derivation: By heating a mixture of coke, sand, salt and sawdust in the electric furnace.
Grades: Grains, from 10 mesh to finest powders.
Containers: Kegs.
Uses: Abrasive; grindstones; hones; sharpening-stones; anti-slip pavements; grinding wheels; refractories; rendering cements more resistive to wear; electric resistances; etc.
Railroad shipping regulations: None.*

Carbromal. See Bromodiethylacetylurea.

Carbromalum. See Bromodiethylacetylurea.

Carbrosolite. A German trade name for silicon carbide.

Carburetted Water Gas.
Steam is decomposed by the action of incandescent carbon and the products of this reaction are mixed with oil vapor in a carburetter. A typical scrubbed gas will have the following approximate composition:

	Per Cent.
Illuminants	13.3
Carbon monoxide	30.4
Hydrogen	37.7
Methane	10.0
Ethane	3.2
Carbon dioxide	3.0
Oxygen	0.4
Nitrogen	2.1
B.t.u.	643.0
Candle power	22.1

Uses: Illuminating gas.

Cardamom Oil, Ceylon Long.
Color and properties: Pale-yellow, essential oil; strongly aromatic, camphoraceous odor and taste.
Chief known constituents: Terpinene, terpinenol-4-sabinene.
Constants: Sp.gr. 0.895 to 0.905; refractive index 1.460 to 1.470; optical rotation +12° to +15°; saponification value 25 to 70.
Solubility in alcohol: In 1 to 2 vols. or more of 80% alcohol.
Derivation: Distilled from the seeds of Eletteria cardamomum var. B., Flückiger.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Flavoring; liqueurs; medicine.
Railroad shipping regulations: None.*

Cardamom Oil, Malabar or Ceylon-Malabar.
Color and properties: Pale-yellow, essential oil; strongly aromatic, camphoraceous odor and taste.
Chief known constituents: Cineole, terpineol, terpinylacetate, limonene.
Constants: Sp.gr. 0.923 to 0.944 at 15°C.; optical rotation +24 to +41°; refractive index 1.462 to 1.467; acid value up to 4.0; ester value 94 to 150.
Solubility in alcohol: In 2 to 5 vols. and more of 70% alcohol.
Derivation: Distilled from the seed of a species of Eletteria.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine; liqueurs.
Railroad shipping regulations: None.*

Cardamom Oil, Siam.
Color and properties: Pale yellow viscous essential oil; strongly aromatic, camphoraceous odor and taste. Borneol content: 22.5%.
Chief known constituents: Borneol, camphor, cineole and sesquiterpenes.
Constants: Sp.gr. 0.905 at 42°C.; optical rotation +38° 4′; refractive index 1.4339; saponification value 18.8; after acetylation 77.2.
Soluble in 1.2 vols. of 80% alcohol.
Derivation: Distilled from the seed of a species of Eletteria.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Cardamom Seeds.
Derivation: Dried, nearly ripe fruit of Elettaria cardamomum.
Habitat: Malabar; cultivated in India and Ceylon.
Grades: Technical; U.S.P.
Containers: Bags; boxes.
Uses: Medicine (aromatic); condiment; source of perfume extracts.
Railroad shipping regulations: None.*

Carex (Sand sedge, Sand star; Red couch-grass; German sarsaparilla).
Derivation: The rhizome of Carex arenaria.
Habitat: Europe, adventitious in United States.
Grades: Technical.
Containers: Bales.
Uses: Medicine.
Railroad shipping regulations: None.*

Cargentos. Colloidal silver oxide containing an equivalent of 50% metallic silver. Used in medicine as an antibacterial, unofficial. See also Silver, colloidal.

Carica Papaya. See Papaw.

Carmine.
Bright red pigment.
Soluble in water and alcohol.
Derivation: Combination of carminic acid and aluminum; precipitation of cochineal with alum.
Grades: Technical; N.F.
Containers: Tins.
Uses: Dyes, inks, indicator in chemical analysis; coloring food materials, medicines, etc.
Railroad shipping regulations: None.*

Carminic Acid $C_{22}H_{22}O_{13}$.
Color and properties: Dark, purplish-brown mass or bright-red powder.
Constants: M.p.: Decomposes at 136°C.
Soluble in water, alcohol and ether.
Derivation: By extraction from Coccus cacti (Cochineal).
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Stain in microscopy; indicator in analytical chemistry; coloring proprietary medicines; pigment for fine oil colors; color photography; dyeing.
Railroad shipping regulations: None.*

Carnallite $KCl.MgCl.6H_2O$ or $KMgCl_3.6H_2O$.
A natural hydrated double chloride of potassium and magnesium. Color, white, brownish and reddish; streak, white; shining, greasy luster.
Constants: Sp.gr. 1.62; hardness 1.
Occurrence: Germany, Alsace.
Uses: The chief commercial source of manufactured potash salts.

Carnauba Wax (Brazil wax).
Color and properties: Hard, amorphous, yellowish-green or light yellow, brittle lumps; peculiar, agreeable odor.
Constants: Sp.gr. 0.995°C.; m.p. 84° to 86°C.
Soluble in ether, boiling alcohol and alkalis; insoluble in water.
Derivation: An exudation from leaves of the wax palm Copernica cerifera (Brazil).
Grades: Technical.
Containers: Bags; boxes.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Substitute for beeswax, shoe-polishes; candles, leather finishes, varnishes; electrical insulating compositions; furniture polishes; phonograph records; carbon paper coating.

Railroad shipping regulations: None.*

Carnegeite. See Feldspar.

Carnelian. A clear pale to deep red chalcedony (q.v.), sometimes brownish-red to brown.

Carnotite.

A hydrated vanadium-uranium-potassium mineral sometimes found as loosely cohering masses of minute scales but oftener disseminated filling interstices in sandstone. Usually a canary or lemon yellow but sometimes is red or black. The potassium may be replaced by calcium. It is proposed to use the name carnotite for the potassium compound and tyuyamunite for the calcium compound.

Suggested formula for carnotite: $K_2O._2U_2O_3.V_2O_5.3H_2O$.

Soluble in hydrochloric or nitric acids.

Occurrence: United States (Colorado, Pennsylvania, Utah), Australia, Russia.

Uses: Source of uranium and radium.

Carnot's Reagent. 100 grams of basic bismuth nitrate dissolved in hot concentrated hydrochloric acid and diluted to a liter with 92% alcohol.

Carolina Pink. See Spigelia.

Carophyllic Acid. See Eugenol.

Caro's Reagent. A pasty mass of great oxidizing power obtained by dissolving ammonium or potassium persulfate in concentrated sulfuric acid. Used in testing alkaloids.

Carolina Jessamine. See Gelsemium.

Carony Bark. See Angostura.

Carotin (Carrotin; Carotine) $C_{40}H_{56}$.

A red pigment which accompanies chlorophyll in green plants. It is also the coloring matter of carrots. Used in coloring butter and cheese.

Carotine. See Carotin.

Carpaïne $C_{14}H_{25}NO_2$.

Color and properties: White crystalline alkaloid.

Constants: M.p. 121°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: By extraction from the leaves of Carica papaya.

Method of purification: Crystallization.

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Carpaïne Hydrochloride $C_{14}H_{25}NO_2.HCl$.

Color and properties: White crystals.

Constants: M.p. 225°C.

Soluble in water, alcohol and ether.

Derivation: By solution of carpaïne in hydrochloric acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles; tins.

Uses: Medicine.

Railroad shipping regulations: None.*

Carpatic Balsam. See Riga balsam.

Carpenter Stainless Steels. Ferrous alloys which in addition to the iron contain the following percentages of other metals: (a) No. 1 contains 12 to 14% chromium and 0.1% carbon. It is resistant to corrosion of sea and mine waters, ammonia and nitric acid and moist sulfurous atmospheres, but will not resist hydrochloric acid or fused caustic soda. (b) No. 2 contains 12 to 14% chromium and 0.3% carbon. When properly hardened and free from scale it resists corrosion of nitric acid, mine water, ammonia and other alkaline solutions but will not resist hydrochloric acid. (c) No. 3 contains 20% chromium, 1% copper and 0.3% carbon. It resists corrosion of sea and mine waters, nitric and nitrous acids, ammonia and other alkaline solutions but will not resist hydrochloric acid. (d) No. 4 contains 18% chromium, 9.5% nickel and 0.1% carbon. It offers good resistance to all organic and inorganic materials except hydrochloric and hydrofluoric acids, bromine, iodine and certain other aqueous solutions of halogen acids. It is also resistant to mine and sea waters and to moist sulfurous atmospheres. (e) No. 5 contains 14% chromium, 0.4% zirconium and sulfur and 0.1% carbon. It is resistant to sea and mine waters, nitric acid, ammonia and other alkaline solutions but not to hydrochloric, hydrofluoric and pure sulfurous acids.

Carpenter's Glue. See Glue and gelatin.

Carragheen. See Chondrus.

Carrel-Dakin's Solution. An aqueous solution of chlorine compounds of sodium, containing not less than 0.45% and not more than 0.50% of NaOCl, equivalent to from 0.43 to 0.48% of available chlorine.

Note: The therapeutic value of this solution is stated to depend on: (a) A specific sodium hypochlorite concentration. If this is increased or decreased its value is lost. (b) Complete absence of caustic alkali, but with a weak alkaline reaction.

The formula must be strictly followed to produce these particular properties.

Grades: U.S.P.

Uses: Medicine (bactericide in treatment of wounds, irrigation of internal cavities).

Carriage Grease. Mixtures of tallow, vegetable oils and caustic soda or sodium carbonate solution are suitable for this purpose.

Carron Oil. A mixture of linseed or cotton-seed oil with lime water, used in the treatment of burns.

Carrotin. See Carotin.

Carsene. Trade name for a solvent used by the textile and leather industries. It removes mineral oil and similar stains from textile fabrics, and in the leather trade it is used for the purpose of removing spew or mold. It is stated to be ready for use and is non-inflammable.

Carthamic Acid. See Carthamin.

Carthamin (Carthamic acid) $C_{25}H_{24}O_{12}$. The red coloring substance contained in carthamus which renders it suitable as a dye.

Carthamus (Safflower; African saffron; Thistle saffron; American saffron; Dyer's saffron; Dejer's saffron; False saffron; Bastard saffron).

Derivation: Florets of Carthamus tinctorius. Red color, mixed with yellow; peculiar slightly aromatic odor.

Habitat: Levant and Orient; cultivated extensively in Europe and America.

Grades: Technical.

Containers: Bales.

Uses: Medicine (unofficial drug to promote eruption in measles, etc.); coloring cosmetics, liqueurs, butter, sweetmeats and various food products; dyeing artificial flowers; paints.

Railroad shipping regulations: None.*

Carui Oil. See Caraway oil.

Carum. See Caraway.

Carvacrol (Isopropyl-ortho-cresol; Oxycymol) $C_{10}H_{13}OH$.

Color and properties: Thick colorless oil.

Constants: B.p. 233° to 235°C.

Derivation: (a) From origanum oil and the essential oils of labiate plants. (b) Various processes have been suggested for its production synthetically.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: In medicine as a local anesthetic and as a substitute for thymol.
Railroad shipping regulations: None.*

Carvacrol Iodide. See Iodocrol.

Carvol. See Carvone.

Carvone (Carvol) $C_{10}H_{14}O$.
Color and properties: Pale yellowish or colorless liquid; fine caraway-like odor.
Constants: Sp.gr. 0.960; b.p. 230°C.
Soluble in alcohol, ether and chloroform.
Derivation: From caraway, dill, spearmint oils.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; 1, 5 lb. glass bottles.
Uses: Medicine; flavoring; liqueurs; perfumery; toilet soaps.
Railroad shipping regulations: None.*

Caryophyl Oil. See Clove oil.

Caryophyllene (Light clove oil). A sesquiterpine occurring naturally in oil of cloves and other essential oils. Commercially, clove oil from which eugenol has been abstracted. Used in preparation of cheap soap perfumes.

Caryophyllic Acid. See Eugenol.

Caryophyllus (Clove).
Derivation: Dried flower-buds of Eugenia aromatica.
Habitat: Molucca Islands, Zanzibar, Sumatra, South America, West Indies, etc.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine (aromatic); manufacture of clove oil.
Railroad shipping regulations: None.*

Cascara Amarga (Honduras bark).
Derivation: Bark of species of Picramnia pentandra.
Habitat: West Indies and Mexico.
Grades: Technical.
Containers: Bales.
Uses: Medicine (ingredient of compound fluid extract of trifolium).
Railroad shipping regulations: None.*

Cascara Sagrada, Bark (Sacred bark; Chittem bark; Chittam bark; Chittim bark; Persian bark; Bear-berry; Bear wood).
Derivation: Bark of Rhammus purshiana.
Habitat: West coast of the United States.
Properties: The bark loses its cathartic properties on being kept for 1 year.
Grades: Technical; U.S.P.
Containers: Bags; bales.
Uses: Medicine (cathartic).
Railroad shipping regulations: None.*

Cascarilla (Eluthera bark; Sweet-wood bark; Eluteria bark).
Derivation: Bark of Croton eluteria.
Habitat: West Indies.
Grades: Technical; U.S.P.
Containers: Bales, bags or casks.
Uses: Medicine (aromatic and tonic); tobacco flavoring.
Railroad shipping regulations: None.*

Cascarilla Oil.
Color and properties: Yellow to greenish volatile oil; faint aromatic odor and taste.
Constants: Sp.gr. 0.900 to 0.925 at 15°C.; optical rotation +1° to +13°; refractive index 1.491 to 1.496; acid value 3 to 9; ester value 5 to 12, after acetylation 67 to 72.
Soluble in alcohol.
Derivation: By distilling cascarilla bark.
Railroad shipping regulations: None.*

Cascarine. The active principle of cascara bark.

Case-hardening Residues.
Residues from case-hardening mixtures. They contain varying amounts of potash, phosphates, etc. Used as a fertilizer.

Casein.
Color and properties: White to yellowish albuminoid; produced as a granular powder or amorphous lumps.
Soluble in alkalis, alkaline carbonates and moderately strong acids; insoluble in water, alcohol and ether.
Derivation: (a) By precipitation from skim-milk by means of very dilute acids in excess. (b) By means of an enzyme, such as rennet, yielding calcium para-caseinogenate.
Grades: Technical.
Containers: 25 lb. boxes; 100 lb. bags; 300 lb. barrels.
Uses: Food (cheese, diabetic flour, baking powders); leather finishing; adhesives; substitute for albumin, celluloid, shellac, gelatin, gums, horn and hard rubber; manufacture of galalith; added to copper insecticidal preparations to increase their adherent powers; added to ceramic pastes to increase the hardness of the burnt ware; linoleum filler; casein paints and varnishes; waterproof paints; paper (sizing, waterproofing, glazed paper, cardboard, washable and antiseptic wall paper, containers, erasable slates and drawing papers); massage creams; pharmaceuticals (caseinates); films; ornaments and novelties; textiles (fixing agent in calico printing, dyeing fabrics, weighting and softening agent for silks and cottons); producing metallic lusters and high gloss on fabrics; wine making (clarifier).
Railroad shipping regulations: None.*

Casein Ammonia. See Eucasin.

Casein Colors. Colors prepared in such a form that when mixed with water they become available in a few minutes for use as paints. They usually consist of finely powdered casein (q.v.) mixed with sifted slaked lime and suitable pigments. The proportion of lime to casein is very important in order to obtain the best results and it is also necessary to use only those pigments which are not affected by lime.

Casein Glue. See Glue and gelatin.

Casein Magnesia.
Derivation: Powdered casein, magnesia and water.
Uses: Fixing agent for rendering mineral pigments fast to washing.

Cashew Gum. See Anacardium.

Cashew-nut Oil. See Cashew oil.

Cashew Oil (Cashew-nut oil).
Color and properties: Clear, pale yellow, colorless, fixed oil.
Constants: Saponification value 179.84; iodine number 60.6.
Soluble in alcohol, ether, benzene and carbon bisulfide; insoluble in water.
Derivation: From the cashew nut, Anacardium occidentale, by expression.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Cashoo. See Catechu.

Cassava Starch.
Derivation: From the roots of several species of manihot, by heating the damp starch in shallow pans, the granules burst and adhere together, forming irregularly shaped, translucent kernels, known as tapioca.
Grades: Technical.
Containers: Burlap bags; wooden barrels.
Uses: Foodstuffs; laundry starches; adhesives.
Railroad shipping regulations: None.*

Cassel Brown. See Vandyke brown.

Cassel Earth. See Vandyke brown.

Cassel Yellow. See Turner's yellow.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Cassel's Green. See Barium manganate.

Cassella's Acid. See 2-Naphthol-7-sulfonic acid.

Cassella's F. Acid. See 2-Naphthylamine-7-sulfonic acid.

Cassia Bark. See Cinnamon, cassia.

Cassia Fistula (Purging cassia; Drumstick; Indian laburnum; Pudding pipe; Pudding stick).
Derivation: Dried fruit of Cathartocarpus fistula.
Habitat: Upper Egypt and East India; cultivated in tropical America and Africa.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (laxative).

Cassia Oil (Chinese cinnamon oil).
Color and properties: Yellow or brownish limpid liquid; cinnamon-like odor; burning and intensely sweet taste.
Chief known constituents: Cinnamic aldehyde (70 to 90%); cinnamic esters; terpenes; salicylic aldehyde; coumarin; phenylpropyl acetate.
Constants: Sp.gr. 1.045 to 1.063; optical rotation +1° to −1°; b.p. 240° to 260°C.; refractive index 1.585 to 1.605.
Solubility in alcohol: In 1 to 2 vols. of 80% alcohol; in 2 to 3 vols. of 70% alcohol (sometimes with opalescence and turbidity).
Derivation: Distilled from the twigs and leaves of Cinnamomum cassia.
Adulteration: Fatty oils, cedar-wood oil, gurjun-balsam oil, colophony, petroleum.
Containers: Bottles, tins, cases.
Uses: Flavoring; perfumery.
Railroad shipping regulations: None.*

Cassiterite (Stream tin; Tin stone; Wood tin)
SnO_2, usually with some Fe_2O_3, and sometimes Ta_2O_5, As_2O_5, SiO_2 or Mn_2O_3.
Brown to nearly black mineral, sometimes red, gray, or yellow. Adamantine to dull luster. Contains 78.6% of tin. Insoluble in acids.
Constants: Sp.gr. 6.8 to 7.1; hardness 6 to 7.
Occurrence: United States (California, Colorado, Connecticut, Georgia, Idaho, Maine, New Hampshire, North Carolina, South Carolina, South Dakota, Texas, Virginia, Washington, Wyoming, Alaska), England, Germany, Italy, China.
Uses: The source of practically all the tin now used.

Cassius' Purple. See Gold-tin purple.

Castanea (Chestnut leaves).
Dried leaves of Castanea dentata.
Habitat: North America, Europe.
Grades: N.F.
Uses: Medicine (mild astringent).

Castanha Oil (Brazil-nut oil)
Color and properties: Pale, yellow, odorless, fixed oil.
Constants: Sp.gr. 0.9180; m.p. 0.4°C.; saponification value 193.4; iodine number 106.22.
Soluble in ether, carbon bisulfide and benzene; insoluble in water.
Derivation: From the brazil-nut, Bertholletia excelsa, by expression.
Grades: Technical.
Containers: Tins; iron drums.
Uses: Perfumery; soap; food; illumination.
Railroad shipping regulations: None.*

Cast-iron. See Iron and steel.

Castile Soap. See Soap.

Castor.
Derivation: Dried preputial follicles with their secretions of the common beaver (Castor fiber). Solid unctuous masses contained in pairs of sacs, each about 2 in. in length.
Grades: Canadian or American; Russian.
Containers: Boxes.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Castor Bean. See Ricinus.

Castor Cake. The cakes formed in the press when the seeds are subjected to hydraulic pressure in order to express the castor oil. See Castor pomace.

Castor Machine Oil. A solution of an aluminum soap in paraffin or light neutral oil. It is generally available in three grades and is used for lubricating axles, journals and harvesters.

Castor Meal.
The mealy form assumed by castor seeds after the crushing and heating operations preparatory to the expression of the oil in either the hydraulic presses or the expeller. If the oil cake be ground the product again is in this mealy form. Used as a fertilizer.
Railroad shipping regulations: None.*

Castor Oil (Ricinus oil).
Color and properties: Thick yellow to yellowish-brown liquid with little odor but somewhat nauseous taste.
Constants: Sp.gr. 0.960 to 0.970; saponification value 178; iodine value 85; acid value 19.21.
Soluble in alcohol, ether, benzene, chloroform and carbon bisulfide.
Derivation: From the seeds of Ricinus communis. They are cold pressed for the first grade of medicinal oil and hot pressed for the common qualities, about 40% of the oil content of the bean being obtained.
Chief constituent: Ricinolein (glyceride of ricinoleic acid).
Grades: U.S.P.; AA; No. 1; No. 3.
Containers: 80 lb. cases; 400-450 lb. barrels.
Uses: Medicine (cathartic diluent or vehicle); high-grade lubricant; leather preservative (as such and in compositions); textiles (cotton dyeing, preparation of sulfonated oils, Turkey red oil); fly paper; fly oils and dope; electrical insulating compositions; toilet creams and hair dressings; special soaps; rubber substitutes.
Railroad shipping regulations: None.*

Castor Oil Plant. See Ricinus.

Castor Oil, Soluble. See Blown oils.

Castor Oil, Sulfonated. See Turkey red oil.

Castor Pomace.
The residue of the castor bean after the oil has been expressed. Contains 5 to 8% ammonia, 1 to 1.5% phosphoric acid, 1 to 1.5% potash. Used for fertilizer.
Railroad shipping regulations: None.*

Castorite. A colorless, glassy variety of Petalite (q.v.) found in Elba.

Cataria (Catnip; Catnep; Catmint).
Dried leaves and flowering tops of the perennial plant, Nepeta cataria.
Habitat: Europe; United States.
Grades: N.F.
Uses: Medicine (carminative stimulant, diaphoretic).

Catechol. See Pyrocatechol.

Catechu (Cachou; Black catechu; Cashoo; Cutch; Kutch; Katechu; Japan earth; Pegu catechu; Terra japonica).
Derivation: An extract from the wood and pods of Acacia catechu and from the betel nut, the fruit of Areca catechu, a species of the palm tree. Both are natives of India.
Grades: Extract: 25% tannin; Solid: 50% tannin.
Containers: Extract: 400-500 lb. wooden barrels; Solid: 100, 112 lb. boxes; 110 lb. bales.
Uses: Textile dyeing; tanning industry; staining wood; boiler compounds; dentifrices; pharmaceuticals.
Railroad shipping regulations: None.*

Catlinite (Indian pipestone). A red clay found in southwestern Minnesota and formerly used by the Indians for making pipes. Soft when freshly quarried, hardens on exposure to air.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Catmint. See Cataria.

Catnep. See Cataria.

Catnip. See Cataria.

Cat's Eye (Cymophane).
A form of native silica or quartz (q.v.) sometimes containing fibers of asbestos. Exhibits opalescence, but without prismatic colors. Oriental cat's eye, a gem variety, sometimes also known as cymophane is a variety of chrysoberyl (q.v.). A bluish milky band of reflected light travels across the convex polished surface as the stone is moved about.

Cat's Hair. See Euphorbia.

Caulophyllum (Blue cohosh; Squawroot).
Rhizome and roots of Caulophyllum thalictroides.
Habitat: United States and Japan.
Grades: Technical; N.F.
Containers: Bales.
Uses: Medicine (for its effect on the muscles).
Railroad shipping regulations: None.*

Caustic. When used alone usually alludes to caustic soda, sodium hydroxide.

Caustic Alcohol Solution.
Color and properties: Colorless, syrupy liquid; becomes brown on keeping.
Constants: Sp.gr. 0.867.
Derivation: An 18% alcoholic solution of sodium ethylate.
Uses: Medicine (powerful caustic, unofficial).
Railroad shipping regulations: Red label.

Caustic Baryta. See Barium hydroxide.

Caustic, Cream. See Cream caustic.

Caustic Lime. See Calcium hydroxide.

Caustic, Lunar. See Silver nitrate, fused.

Caustic Mitigated.
Color and properties: White or grayish-white cylindrical rods or cones. Less energetic than fused silver nitrate.
Soluble in water; sparingly soluble in alcohol.
Derivation: By fusing together (1 part) silver nitrate and (2 parts) potassium nitrate.
Uses: Medicine (escharotic, germicide, counterirritant).
Railroad shipping regulations: None.*

Caustic Oil of Arsenic. See Arsenic chloride.

Caustic Potash. See Potassium hydroxide.

Caustic Soda. See Sodium hydroxide.

Caustic, Toughened. See Silver nitrate, fused.

Caustic, Vienna (Vienna paste). A mixture of potash and lime. Used as a medicine in the extirpation of malignant growths, unofficial.

Caustic, White. See Sodium hydroxide.

Causticized Ash.
Combinations of soda ash and caustic soda in definite proportions marketed for purposes where an alkali is needed ranging in causticity between soda ash and caustic soda. Causticized ash is usually designated by its caustic soda content and the range of standard marketed products embraces 7%, 10%, 15%, 25%, 36%, 45%, and 67% of caustic soda. The industrial field includes those processes utilizing mechanical means for applying the cleansing liquids; e.g., metal cleaning, creamery and beverage bottle cleaning, etc.
Railroad shipping regulations: None.*

Cayenne Linaloe Oil. See Linaloe oil.

Cayenne Pepper. See Capsicum.

Cayota.
Color and properties: Reddish-brown bark. Contains 23 to 30% tannin.
Habitat: Mexico.
Uses: Tanning leather in Mexico.

Cazeline Oil. A mineral burning oil. See Burning oils, mineral.

Cebil Gum.
Color and properties: Reddish-yellow tears or dark-colored angular masses. Gives a viscous, odorless, reddish-yellow mucilage, acid reaction.
Derivation: From Piptademia cebil griseb, a Brazilian leguminous tree.

Cedar. See Cedrus.

Cedar Gum.
Color and properties: Pale yellow or brownish tears; astringent taste. Swells greatly in water and almost dissolves. Contains 68% arabin, 6% metarabin, no resin.
Derivation: From Cedrela toona Rexb. or red cedar found in India and Australia.
Railroad shipping regulations: None.*

Cedar-leaf Oil.
There are two varieties: (a) True cedar-leaf oil; (b) commercial cedar-leaf oil.
Color and properties: Colorless liquid; thuja-like odor.
Chief known constituents: Pinene; limonene; cadinene; borneol; bornyl esters.
Constants: (a) Sp.gr. 0.887 to 0.900 at 15°C.; optical rotation +59° 25′; saponification value 10.9; ester value after acetylation 39.1; (b) Sp.gr. 0.863 to 0.920; optical rotation −3° 40′ to −24° 10′.
Solubility in alcohol: (a) Insoluble in 10 vols. of 80% alcohol; (b) some soluble, some insoluble in 4 to 5 vols. of 70% alcohol.
Derivation: True cedar-leaf oil is distilled from the leaves of Juniperus virginiana. However, commercial varieties are usually distilled from a mixture of the leaves of Juniperus virginiana and Thuja occidentalis and the mixture may sometimes also contain the leaves of other conifers.
Containers: Tins; bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Cedar-wood Oil.
Color and properties: Volatile oil; colorless, pale yellow or greenish-yellow; mild, agreeable, persistent odor. Somewhat viscid and occasionally studded with cedar camphor crystals. Poisonous!
Chief constituent: Cedrene.
Constants: (a) Sp.gr. 0.943 to 0.961 at 15°C.; optical rotation −25° to −42°; refractive index about 1.504; acid value up to about 1; ester value up to 6.5, after acetylation 26 to 42. (b) Sp.gr. 0.940 to 0.944 at 15°C.; optical rotation −40° to −46° 22′; saponification value 2 to 4; ester value after acetylation 14 to 18.
Solubility in alcohol: (a) 1 vol. in 10 to 20 vols. of 90% alcohol up to 6 vols. of 95% alcohol; (b) in 5 to 6 vols. of 95% alcohol.
Derivation: (1) Distilled from the wood of Juniperus virginiana. Probably represented by (a). (2) Collected as a by-product from the drying kilns in lead-pencil manufacture. Probably represented by (b).
Containers: Bottles; tins; drums.
Uses: Medicine; perfumery; perfuming soap; insectifuge.

Cédrat Oil. See Citron oil.

Cedrus (Cedar; Larix cedrus). Wood of Cedrus libani.
Habitat: Asia Minor.
Uses: Source of cedar oil.
Railroad shipping regulations: None.*

Celandine. See Chelidonium.

Celastoid. A trade name for non-inflammable celluloid substitute prepared from cellulose acetate.

Celery-fruits Oil. See Celery-seeds oil.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive,*

Celery-leaves Oil.

Color and properties: Limpid, greenish-yellow oil; strong odor of fresh celery leaves.

Constants: Sp.gr. 0.848 to 0.880 at 15°C. (highest when derived from leaves and fruits); optical rotation +41° to +60°; refractive index 1.478 to 1.481; acid value up to 3; ester value 28 to 52; after acetylation 33 to 58.

Solubility in alcohol: Variable in 3 to 5, or 7 to 10 vols. of 90% alcohol; readily soluble in 0.5 vol. and more of 95% alcohol.

Derivation: Distilled from either the leaves or a mixture of the fruit and leaves of Apium graveolens.

Containers: Bottles.

Uses: Flavoring; medicine.

Railroad shipping regulations: None.*

Celery Oil, Terpeneless.

Concentration: About 8 times that of the ordinary celery oil.

Railroad shipping regulations: None.*

Celery-seed Oil (Celery-fruits oil).

Color and properties: Limpid, greenish-yellow oil; characteristic odor; celery taste.

Chief known constituents: Limonene, phenols, sedanolide, sedanonic acid.

Constants: Sp.gr. 0.866 to 0.894 at 15°C., mostly above 0.872; optical rotation +60° to +82°; refractive index 1.478 to 1.486; acid value up to 4; ester value 16 to 45, after acetylation 43 to 52.

Solubility in alcohol: In 6 to 8 vols. of 90% alcohol, mostly with turbidity; in 1 to 1.2 vols. of 95% alcohol, occasionally with opalescence.

Soluble in ether and chloroform.

Derivation: Distilled from the fruit of Apium graveolens.

Containers: Bottles.

Uses: Flavoring; medicine.

Celesian. See Feldspar.

Celestial Blue. See Iron blues.

Celestine. See Celestite.

Celestite (Coelestin; Celestine) $SrSO_4$.

A natural strontium sulfate containing 56.4% SrO, sometimes with calcium and barium. White in color, often with a faint bluish tinge and resembles barite (q.v.) in appearance.

Constants: Sp.gr. 3.95 to 3.97; hardness 3 to 3.5.

Occurrence: United States (Ohio, Arizona, California), England, Sicily, Turkestan, Baluchistan.

Uses: Chemicals (strontium salts).

Cellactite.

A plastic which is stated to be acid proof, to have high dielectric properties, and to be capable of sustaining nailing, punching or screwing.

Derivation: Hard pitch is dispersed with water and resin soap. Asbestos or cellulose pulp is added to the dispersion and the product converted into soft, pliable sheets on a paper machine. The sheets are then subjected to pressure in a press.

Cellite. A cellulose-acetate plastic which is stated to be much less inflammable than celluloid.

Celloidin (Celluidine; Photoxylin).

Color and properties: Slightly milky, white, transparent, tough gelatinous tablets, chips or shreds.

Soluble in alcohol and ether.

Derivation: A very pure nitrocellulose obtained by precipitation from an ether-alcohol solution of collodion cotton.

Grades: Technical.

Containers: Wooden kegs; bags.

Uses: Imbedding sections in microscopy; electrochemistry; photography; galvanoplastics.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Cellon (Sicoid). A German cellulose-acetate plastic. It is said to have the desirable property of being much less inflammable than pyroxylin plastics. Its most successful application has been for motion picture films. Its film is not, however, as strong as pyroxylin film.

Cellophane.

A cellulose product which is stated to be homogeneous, non-fibrous, transparent, strong, flexible, oil-, dust- and air-proof. A special product, "Moistureproof Cellophane" is almost entirely resistant to water-vapor diffusion.

Derivation: Highly purified cellulose is mercerized with caustic soda, the resulting alkali-cellulose is treated with carbon bisulfide to form cellulose xanthate which is dissolved in water and caustic soda to form viscose. Thin layers of viscose are coagulated by a solution of mineral salts and the cellulose regenerated by mineral acids. The sheet so obtained is washed, bleached, impregnated with a softener such as glycerol and dried.

Uses: Transparent wrapping material, projection film base, dialyzing membrane, balloon gas-cell lining, millinery specialties.

Containers: Wood, cardboard, paper.

Fire hazard: Same as newsprint paper (Underwriter's Laboratories Guide No. 540 1 23).

Railroad shipping regulations: None.*

Cellosolve (Ethylene glycol ethyl ether) $CH_2OHCH_2OC_2H_5$.

Color and properties: Colorless liquid, practically odorless; high dilution ratio with coal-tar hydrocarbons.

Constants: B.p. 134.8°C.; weight per gal. 7.8 lbs. at 15.6°C.

Grades: Technical.

Containers: 5, 10, 55, 110 gal. drums; net contents 35, 75, 400, 800 lbs.; 8,000 gal. tank cars.

Uses: Solvent for nitrocellulose and other organic compounds; lacquers and lacquer thinners; printing of textiles.

Railroad shipping regulations: None.*

Cellosolve Acetate $CH_2OC_2H_5CH_2C_2H_3O_2$.

Color and properties: Colorless liquid; slight odor.

Constants: B.p. 153°C.; weight per gal. 8.1 lb. at 15.6°C.

Grades: Technical.

Containers: 5, 10, 55 gal. drums; net contents 35, 75, 405 lbs.; 8,000 gal. tank cars.

Uses: Solvent for nitrocellulose and resins; retards "blushing" in lacquers.

Railroad shipping regulations: None.*

Celluidine. See Celloidin.

Cellulith. A trade name for material made by beating paper pulp until the fibers entirely disappear, followed by boiling, settling, and drying. The resulting product is a horny mass which is somewhat similar to vulcanized fiber (q.v.).

Celluloid (Parkesine; Zylonite).

Derivation: By mixing nitrocellulose and camphor in the following manner: Well stabilized, powdered, and partially dried collodion cotton is soaked in alcohol in a covered centrifuge, then gelatinized with alcohol and one-third or one-fourth of its weight of camphor, pigment is added if necessary, homogenized between rolls and then formed into dense, compact blocks by pressing while hot. It is then ready to be cut, sawn and polished. Various substitutes for the camphor are used.

Uses: Toilet articles; toys; amber substitute; ivory substitute; ebonite substitute; tortoiseshell substitute; photographic films.

Grades: Technical.

Containers: Wooden or cardboard boxes.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label for express shipments.

Cellulon. A trade name for a fiber made from wood pulp in Germany.

Cellulose $C_6H_{10}O_5$. Cellulose is the preponderant and essential constituent of all vegetable tissues and fibers. It is the basis of the textile and paper-making industries. Pure cellulose is most readily obtained from cotton-wool by treatment with dilute alkalis and acids and thorough washing. The cellulose obtained in this manner is a white substance of sp.gr. about 1.45, retaining the form of the cotton fibers. Cellulose dissolves in Schweitzer's reagent (cuprammonium) which consists of copper hydroxide dissolved in ammonia. It dissolves in no other liquid without chemical change. When nitrated it yields pyroxylin or nitrocellulose (guncotton), used as such and in the manufacture of smokeless powders, collodion, celluloid and pyroxylin lacquers and miscellaneous products, and also artificial silk. Sulfuric acid converts cellulose into dextrin and glucose and, as the glucose is readily fermentable to ethyl alcohol, this is the basis of the processes for making ethyl alcohol from wood waste. Cellulose with glacial acetic acid forms cellulose acetate used in viscose products, airplane dopes, non-inflammable photographic films, etc. Cellulose is found in the paper industry chiefly as sulfite pulp, soda pulp and sulfate pulp. Spruce sulfite pulp contains upwards of 80% cellulose.

Cellulose Acetate (Sericose).
(a) $C_6H_5(CO_2CH_3)_5$.
(b) $C_6H_6O(CO_2CH_3)_4$.
(c) $C_6H_7O_2(CO_2CH_3)_3$.
Color and properties: Yellowish, transparent amorphous mass. Non-inflammable.
(a) Soluble in alcohol; insoluble in water; (b) Insoluble in water; (c) Insoluble in water, alcohol and ether.
Derivation: By the acetylization of cellulose in presence of sulfuric acid.
Grades: Technical.
Containers: No standard-sized packages.
Uses: Artificial silk; airplane dope; non-inflammable photographic and cinematograph films; electrical insulations; electrical condensers; coating glass to prevent clouding by condensed moisture; non-shatterable glass; lacquers; varnishes; rendering leather non-inflammable and impermeable; phonograph records; sizing and finishing material; non-inflammable plastics; rubber substitutes; rendering textiles non-inflammable and impervious.
Railroad shipping regulations: None.*

Cellulose-acetate Silk. See Rayon.

Cellulose, Animal (Tunicin). A variety of animal cellulose found in the tunic of the tunicates.

Cellulose-nitrate silk. See Rayon.

Celtium Ct. One of the rare earth metals (q.v.).

Cement Rock. Argillaceous limestone used in the manufacture of natural hydraulic cement. Contains lime, silica, and alumina in varying proportions, and usually more or less magnesia.

Cementite Fe_3C.
A carbide of iron formed in the manufacture of pig iron and steel. It is composed of 93.33% iron and 6.67% carbon. It is very hard and brittle and will scratch glass and feldspar, but not quartz. It is about two-thirds as magnetic as pure iron under an exciting current. It occurs free in ordinary steels of more than 0.85% carbon and takes its name from cement steel, made by the cementation process, which contains a great deal of this carbide. See also Ferrite; Pearlite; Carbon, combined; Carbon, graphitic.

Cements, Electric.
The three cements given are well known but the list is not offered as being complete:
Faraday's Cement.
A cement composed of about five parts resin and one part each of beeswax and red ocher. Used for cementing brasswork to glass.
Singer's Electric Cement.
A cement composed of about twenty parts resin, four parts each of beeswax and red ocher and one part of plaster of Paris. It is used for cementing brasswork to glass.
Varley's Cement.
A cement composed of sixteen parts of black resin, sixteen parts of dried whiting and one part of beeswax. It is used for cementing brass to glass.

Cements, Linoleum.
Oxidised linseed oil, kauri gum and rosin melted and mixed with powdered cork, pigments and fillers, will give satisfactory cements.

Cements, Structural.
Eisen-Portland Cement (Iron-portland cement).
A cement composed of 30% granulated highly basic slag and 70% Portland cement made from limestone and slag.
Grapier Cement. See Grappier cement.
Grappier Cement (Grapier cement).
Cements made by finely grinding the hard lumps left when hydraulic limes (q.v.) are slaked and then sieved. They consist of unchanged limestone and calcium silicates. Le Farge cement belongs to this class.
Hydraulic Cement.
Any cement that hardens under water.
Iron Cements. Cements containing varying amounts of iron. Typical of these are Portland cement, eisen-portland cement, sidero cement, slag cement, iron-ore cement, etc.
Iron-Ore Cement.
Cements in which ferric oxide replaces a large part of the alumina. There must always be some alumina present, as all attempts to prepare Portland cement in which the whole of this substance is replaced with ferric oxide have met with failure.
Iron Portland Cement. See Eisen-Portland cement.
Keene's Cement. Produced by calcining gypsum or by partially calcining lump gypsum, soaking the lumps in a solution of alum or aluminum sulfate, recalcining and grinding. Used as a building material.
Le Farge Cement. See Grappier cement.
Le Sage Cement.
A French natural cement made from nodules found at Boulogne-sur-Mer, France. When first prepared it was called plaster cement. French natural cements closely resemble Roman cement (q.v.) except for their lower specific gravity.
Louisville Cement.
An American natural cement made from cement rock found near Louisville, Kentucky. It is similar to Rosendale cement but contains less magnesia.
Mack's Cement.
A cement made by adding potassium sulfate or calcined sodium sulfate to dehydrated gypsum.
Magnesium Cement. See Magnesium oxychloride cement.
Magnesium Oxychloride Cement (Sorel cement, Magnesia cement, Lignolite, Xylolite, Xylolith, Lito-silo).
A product formed by reaction between magnesium chloride, water and properly prepared magnesia. It is usually referred to as Sorel cement or magnesium oxychloride cement on account of its supposed composition. Its chemical formula has not been definitely determined since the final product is influenced by many factors, e.g., temperature, propor-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

tions of the ingredients, time of the reaction, etc. One formula offered is as follows: $MgCl_2.3MgO.10H_2O$. Sorel, who did no work to clear up this point, merely announced it to be a magnesia oxychloride cement whose hardness varied with the strength of the magnesium chloride solution used and that solutions ranging in density from 20° to 30°Bé were the most suitable. It was first used as an artificial building stone (Sorel stone) and now in the manufacture of artificial marble for interior decoration of buildings. Mixed with fillers (such as wood flour, cork, talc, silica, asbestos, clay, marble dust, sand, etc.) it forms the product much used as sanitary, resilient stone flooring in large modern buildings. For additional information see: Bulletin of the University of Wisconsin, vol. 8, Nov. 1917; U. S. Bureau of Mines Bulletin, "Plastic Magnesia," 1925; U. S. Bureau of Standards Circular No. 323.

Note: Powdered magnesia alone is frequently called magnesia cement.

Martin's Cement.

Similar to Keene's cement (q.v.) with the difference that potassium carbonate solution is used instead of alum solution.

Medina Cement.

A variety of Roman cement made from a stone found in the Isle of Wight, England.

Natural Cement.

Cements produced by burning and grinding cement rock (q.v.). They may be divided into two classes, namely, those which contain a larger proportion of lime and are calcined at a higher temperature than those of the second class, which excepting the high percentage of magnesia, resemble Roman cement (q.v.). They do not slake with water but must be ground in order to convert them into a hydraulic cement.

Chemical and physical properties:

The American Society for Testing Materials reports that "In connection with its reports on the Standard Specifications and Tests for Portland Cement (Serial Designation: C 9), Committee C-1 on Cement has declared its purpose to give consideration to the revision of the present Standard Specifications for Natural Cement, and recommended that in the meantime the methods of tests for Portland cement be applied to the testing of natural cement." See Portland cement.

Parian Cement.

Similar to Keene's cement (q.v.) with the difference that borax solution is used instead of alum solution, or it may be made by burning an intimate mixture of powdered gypsum and dry borax and grinding the product to a fine powder.

Parker's Cement. See Roman cement.

Plaster Cement. See Le Sage cement.

Portland Cement.

Essentially a mixture of calcium silicate and calcium aluminate, with excess of lime, made by fusing a pulverized mixture of a material rich in lime (limestone) with one in which silica, alumina and iron oxide are the main constituents (clay). The fused clinker mixed with gypsum is pulverized, forming cement. The following are Portland cements typical of the various countries:

America—from 21 to 23.5% silica, from 2.49 to 3.54% ferric oxide, from 5.68 to 8.12% alumina, from 60.25 to 64.12% calcium oxide, from 0.88 to 2.78% magnesia.

Germany—20.48% silica, 3.88% ferric oxide, 7.28% alumina, 64.03% calcium oxide, 1.76% magnesia.

Belgium—23.87% silica, 2.27% ferric oxide, 6.91% alumina, 64.49% calcium oxide, 1.04% magnesia.

France—22.30% silica, 3.50% ferric oxide, 8.50% alumina, 62.80% calcium oxide, 0.45% magnesia.

England—19.75% silica, 5.01% ferric oxide, 7.48% alumina, 61.39% calcium oxide, 1.28% magnesia.

Chemical and physical properties:

Specifications C9-26 of the American Society for Testing Materials:

Chemical Properties, Limits.	
Loss on ignition	4.00% or less
Insoluble residue	0.85% or less
Sulfur (SO_3)	2.00% or less
Magnesia (MgO)	5.00% or less

Physical Properties	
Fineness, 200 mesh	over 78%
100 mesh	
Soundness	steam test no cracking no checking no distortion no disintegration
Initial Set	over 45 minutes
Final Set	less than 10 hrs.
Tensile strength—lbs. per sq. in. 1/3 sand briquets	
7 days	225 or over
28 days	325 or over and above 7 day test

Portland Cement, White.

A very pure Portland cement free of iron compounds.

Pozzolana Cement (Puzzolana cement).

Cements made from slaked lime mixed with natural or artificial burnt siliceous matter. So-named because the most important naturally occurring siliceous matter used in their manufacture is the volcanic materials known as pozzolana, trass, and santorin earth. They are not burnt, the materials being simply mixed together and finely ground. Blast furnace slag is the most important artificial burnt siliceous material used in the manufacture of these cements.

Puzzolana Cement. See Pozzolana cement.

Roman Cement (Parker's cement).

A natural cement made by calcining nodules of argillaceous limestone mixed with calcareous spar. Typical stones run about 60 to 70% calcium carbonate, 18 to 20% silica, 6 to 10% alumina, small quantities of oxides of iron and magnesium. Roman cement is reddish-brown in color, sp.gr. 2.5 to 3.0, and runs about 44% lime, 10% alumina, 20% silica, 7% ferric oxide, 3% magnesia. It is a good hydraulic cement, and, on account of its rapid setting properties, very useful for protecting slow-setting Portland cement, concrete, etc., from the action of sea water. However, for most purposes, it has been almost entirely superseded by Portland cement. The ancient Roman cements were made by mixing slaked lime with volcanic products, such as pozzolana, trass and santorin earth. The materials were not burnt but simply mixed together and ground.

Rosendale Cement.

An American natural cement made from the argillaceous magnesium limestone of the Appalachian range. It contains about 15 to 21% magnesia, 18 to 27% silica, and 2 to 5% alumina.

Sand Cement.

A cement composed of equal parts of sand and Portland cement.

Scott's Cement. See Selenitic cement.

Selenitic Cement (Scott's cement).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

A cement prepared by the addition of 5% of ground plaster of Paris to calcined lime, followed by fine grinding. The feebly hydraulic limes are the most suitable for the purpose although hydraulic limes can be used. Pure limes cannot be used.

This cement sets rapidly and becomes hard quickly. It is buff colored. It has not come into general use, partly because it is not suitable for work which is to be exposed to the weather or to the action of sea water, but particularly because of the superiority of Portland cement.

Sidero Cement.

The first iron-ore cement.

Slag Cement.

Cement prepared either by mixing granulated and finely ground blast-furnace slag with slaked lime or by spraying the granulated slag with a solution of alum, magnesium sulfate or other salt, and grinding the product with lime and gypsum.

Slag cements are usually pale bluish-gray in color, but they may have a brownish tint, owing to the presence of manganese derived from the slag. They differ chemically from Portland cement in containing much less lime and much more alumina. Their specific gravity is low, seldom exceeding 2.8, and their tensile strength is less than that of Portland cement. They are slow in setting, but the setting time may be shortened by adding **caustic soda,** potash, or soda ash either during or after manufacture. They attain their maximum hardness more rapidly than does Portland cement, sometimes during the first month. Their true field is underwater service. They are not so well suited for work which is exposed to the atmosphere.

Sorel Cement. See Magnesium oxychloride cement.

Super Cement.

A cement made by grinding Portland cement clinker with a treated gypsum instead of the ordinary gypsum usually used. This cement is stated to be not only waterproof but stronger than ordinary Portland cement.

Vassy Cement.

A French cement similar to Roman cement. It is very dark in color, due to the large iron content, and is very quick setting when freshly burned.

Centaury. See Erythrea.

Cephaelis. See Ipecac.

Cera Alba. White wax-bleached yellow beeswax.

Cera Flava. Yellow beeswax.

Ceramite. Trade name for a solution of fluosilicates. Used as a cement hardener, a wood preservative and a disinfectant.

Cerargyrite. See Silver haloids, natural.

Cerates. Unctuous substances consisting of oil or lard mixed with wax, spermaceti or rosin, to which various medicaments are frequently added. Consistency intermediate between that of ointments and that of plasters.

Cererite. See Cerite.

Ceresin (Purified ozokerite; Earth wax; Mineral wax; Cerosin; Cerin).

Color and properties: White, waxy cake; odorless; tasteless.

Constants: Sp.gr. 0.92 to 0.94; m.p. 74°C. to 80°C.

Soluble in alcohol, benzene, chloroform, naphtha; insoluble in water.

Derivation: Purification of ozokerite by treatment with concentrated sulfuric acid and filtration through animal charcoal.

Grades: Technical.

Containers: Boxes.

Uses: Candles; sizing; substitute for white wax; bottles for hydrofluoric acid; electrical insulations; shoe and leather polishes; impregnating and preservative agent; doll manufacture; lubricating compounds; wood fillers, floor polishes, antifouling paints; sizing and glossing paper; waxed papers; cosmetics; ointments and other pharmaceutical preparations; acid-proof coating for electrotyper's plates; matrice compositions; in admixture with rosin and sulfur for making printing forms; waterproofing textile fabrics.

Railroad shipping regulations: None.*

Ceresit.

A cement waterproofing compound.

Ceria. See Ceric oxide; also Rare earths.

Ceric-ammonium Nitrate (Cerium-ammonium nitrate) $Ce(NO_3)_4.2NH_4NO_3$.

Color and properties: Small prismatic, orange-red crystals.

Soluble in water and alcohol.

Derivation: By mixing solutions of cerium nitrate and ammonium nitrate, with subsequent crystallization.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs; tins.

Uses: Incandescent gas mantles.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Ceric Fluoride (Cerium fluoride) $CeF_4.H_2O$.

Color and properties: White, amorphous powder.

Soluble in acids; insoluble in water.

Derivation: By the interaction of solutions of cerium nitrate and sodium fluoride.

Grades: Technical.

Containers: Wooden kegs; tins.

Uses: Ceramics.

Railroad shipping regulations: None.*

Ceric Oxide (Cerium dioxide; Cerium oxide) CeO_2.

Color and properties: Pale yellow, heavy powder.

Constants: Sp.gr. 7.65.

Soluble in nitric and sulfuric acids; insoluble in water and dilute acids.

Derivation: By decomposing cerium nitrate by heat.

Impurities: Other rare metal oxides.

Grades: Technical; C.P.

Containers: Wooden kegs.

Uses: Incandescent gas mantles; ceramics.

Railroad shipping regulations: None.*

Ceric Sulfate (Cerium sulfate) $Ce(SO_4)_2.4H_2O$.

Color and properties: Reddish-yellow crystals.

Soluble in water.

Derivation: By the action of sulfuric acid on cerium carbonate.

Method of purification: Crystallization.

Grades: Technical.

Containers: Boxes; glass bottles.

Uses: Reducer in photography.

Railroad shipping regulations: None.*

Cerii Oxalas, U.S.P. See Cerous oxalate.

Cerin. See Ceresin.

Cerine. See Allanite.

Cerinstein. See Cerite.

Cerite (Ochroite; Cererite; Cerinstein).

One of the rare earth minerals (q.v.). It is a hydrated silicate and contains from 60 to 70% of cerium and its allies, together with smaller amounts of iron, calcium and the yttrium earths. Color: between clove-brown and cherry-red to gray.

Constants: Sp.gr. 4.86; hardness 5.5.

Occurrence: Sweden.

Cerium Ce.

Gray, ductile, malleable metal; tarnishes in moist air.

Constants: Sp.gr. 6.92; m.p. 645°C.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in acids; insoluble in water.
Derivation: (a) Reduction of the oxide by magnesium powder; (b) Electrolysis of the fused chloride; (c) By-product from thorium nitrate factories known as cerium residue is treated electrolytically with production of crude cerium metal containing also lanthanum and didymium.
Forms available: Crude cerium; billets 3/16″ to ⅛″ by ¼″ as alloy; cerium residues (15 to 20% CeO_2).
Containers: Boxes.
Uses: Cerium salts; cerium-iron pyrophoric alloys ("misch-metall"); ignition devices; military signalling; illuminant in photography; reducing agent (scavenger in metallurgical work).
Railroad shipping regulations: None.*

Cerium-ammonium Nitrate. See Ceric-ammonium nitrate and Cerous-ammonium nitrate.

Cerium Chloride. See Cerous chloride.

Cerium Dioxide. See Ceric oxide.

Cerium Fluoride. See Ceric fluoride.

Cerium Nitrate. See Cerous nitrate.

Cerium Oxalate. See Cerous oxalate.

Cerium Oxide. See Ceric oxide.

Cerium Sulfate. See Ceric sulfate.

Cerodine. See Veratrine.

Cerosiline (Ceroxylin). A wax obtained from the palm tree.

Cerosin. See Ceresin.

Cerotic Acid $C_{26}H_{52}O_2$ or $C_{25}H_{50}O_2$ or $C_{27}H_{54}O_2$.
An acid obtained from Chinese wax (q.v). M.p. 77.5°C.

Cerotin. See Ceryl alcohol.

Cerous-ammonium Nitrate (Cerium-ammonium nitrate) $Ce_2(NO_3)_6.3NH_4NO_3.10H_2O$.
Color and properties: White, transparent crystals.
Soluble in water and alcohol; insoluble in nitric acid.
Derivation: By adding ammonium hydroxide to a nitric acid solution of cerium nitrate.
Grades: Technical.
Containers: Tins.
Uses: Incandescent gas mantles.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Cerous Chloride (Cerium chloride) $Ce_2Cl_6.14H_2O$.
Color and properties: Reddish-white crystals.
Constants: Sp.gr. 3.88; m.p. 848°C.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on cerium carbonate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Kegs.
Uses: Incandescent gas mantles.
Railroad shipping regulations: None.*

Cerous Nitrate (Cerium nitrate) $Ce(NO_3)_3.6H_2O$.
Color and properties: Red crystals.
Constants: M.p.: Loses $3H_2O$ at 150°C.; b.p.: Decomposes at 200°C.
Soluble in water and alcohol.
Derivation: By the action of nitric acid on cerium or cerium dioxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Incandescent gas mantles.
Fire hazard: Dangerous.*
Railroad **shipping regulations**: Yellow label.

Cerous Oxalate (Cerium oxalate; Cerii oxalas, U.S.P.) $Ce_2(C_2O_4)_3.9H_2O$.
Color and properties: Yellowish-white, odorless, tasteless, crystalline powder.
Constants: M.p.: Decomposes.
Soluble in dilute sulfuric and hydrochloric acids; very slightly soluble in water; insoluble in oxalic acid solution, alkalis, alcohol and ether.
Derivation: By extraction from monazite sand with oxalic acid or with hydrochloric acid and conversion into the oxalate, followed by crystallization.
Method of purification: Recrystallization.
Grades: U.S.P.; the commercial article consists of a complex mixture of oxalates of cerium, lanthanum and didymium, being more or less a by-product in the manufacture of thorium salts.
Containers: 5, 25 lb. boxes; 100 lb. kegs; 200 lb. barrels.
Uses: Medicine; isolation of the metals of the cerium group.
Railroad shipping regulations: None.*

Ceroxylin. See Cerosline.

Ceruse. See Lead carbonate.

Cerussite (White lead ore) $PbCO_3$, often with some silver.
White, gray or colorless mineral (sometimes colored by impurities) of silky or adamantine luster. Contains 83.5% lead monoxide, 16.5% carbon dioxide. Distinguished from anglesite (q.v.) by efferverscence in acids and by frequent occurrence of twinned crystals. Occurs in the upper oxidized zones of veins of lead ore, having been formed by the action of carbonated surface waters on galena (q.v.).
Constants: Sp.gr. 6.46 to 6.51; hardness 3 to 3.5.
Occurrence: United States (Colorado, Arizona, Idaho, California and many other states), Australia, South Africa.
Uses: Important ore of lead.

Cervantite. See Antimony ocher.

Ceryl Alcohol (Cerotin) $C_{27}H_{56}O$. An alcohol obtained from Chinese wax (q.v.) M.p. 80°C.

Ceryl Cerotate $C_{16}H_{53}COOC_{17}H_{55}$. The chief constituent of Chinese wax (q.v.).

Cesalpina Echinata. See Lima wood.

Cesium Cs.
Color and properties: Silver-white, soft ductile metal; decomposes water, setting free hydrogen which ignites. Must be kept immersed in naphtha or kerosene.
Constants: Sp.gr. 1.903; m.p. 28.45°C.; b.p. 670°C.
Soluble in acids and alcohol; decomposes water.
Derivation: By the reduction of cesium oxide by means of powdered magnesium.
Grades: Technical.
Containers: Glass bottles.
Uses: Photo-electric cells to limited extent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Cesium Alum. See Cesium aluminum sulfate.

Cesium-aluminum Sulfate (Cesium alum) $Cs_2SO_4.Al_2(SO_4)_3.24H_2O$.
Color and properties: Colorless crystals.
Constants: Sp.gr. 2.0215; m.p. 117°C.
Soluble in water; insoluble in alcohol.
Derivation: By adding a solution of cesium sulfate to a solution of potassium sulfate, concentrating and crystallizing.
Method of purification: Recrystallization.
Grades: Pure.
Containers: Glass bottles; tins.
Uses: Mineral waters.
Railroad shipping regulations: None.*

Cesium Carbonate Cs_2CO_3.
Color and properties: White, deliquescent, crystalline powder.
Constants: B.p.: Decomposes at 610°C.
Soluble in water, alcohol and ether.
Derivation: By passing carbon dioxide into a solution of cesium oxide and subsequent crystallization.
Grades: Pure.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Glass bottles.
Uses: Brewing; manufacture of mineral waters.
Railroad shipping regulations: None.*

Cesium Chloride CsCl.
Color and properties: Colorless crystals.
Constants: Sp.gr. 3.972; m.p. 646°C.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on cesium oxide and crystallization.
Method of purification: Recrystallization.
Grades: Pure.
Containers: Glass bottles; tins.
Uses: Medicine; brewing; manufacturing mineral waters; evacuation of radio tubes (positive ions supplied at surface of filament).
Railroad shipping regulations: None.*

Cesium Nitrate $CsNO_3$.
Color and properties: Glittering, crystalline powder.
Constants: Sp.gr. 3.687; m.p. 414°C.
Soluble in water; slightly soluble in alcohol.
Derivation: By the action of nitric acid on cesium oxide and crystallization.
Method of purification: Recrystallization.
Grades: Pure.
Containers: Tins; glass bottles.
Uses: Cesium salts.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Cesium Oxides (a) Cs_2O; (b) Cs_2O_2; (c) Cs_2O_3; (d) Cs_2O_4.
Color and properties:
(a) Orange-red crystals.
(b) Yellow needles.
(c) Chocolate-brown crystals.
(d) Yellow crystals:

Constants:	(a)	(b)	(c)	(d)
Specific gravity	4.78	4.47	4.25	3.77
Melting-point	....	400°-450°C.	400°C.	515°C.

Solubilities:

	(a)	(b)	(c)	(d)
Water	Very soluble	Soluble	Decomposed	Soluble
Acids	Soluble	Soluble	Soluble	Soluble

Derivation: By calcining cesium nitrate.
Grades: Technical; pure.
Containers: Tins.
Uses: Cesium salts.
Railroad shipping regulations: None.*

Cesium Silicate Cs_2SiO_3.
Color and properties: Yellow, crystalline powder.
Insoluble in water.
Derivation: By the interaction of a cesium salt and sodium silicate.
Grades: Technical; pure.
Containers: Tins.
Uses: Ceramics.
Railroad shipping regulations: None.*

Cesium Sulfate Cs_2SO_4.
Color and properties: Colorless crystals.
Constants: Sp.gr. 4.2434.
Soluble in water; insoluble in alcohol.
Derivation: By the action of sulfuric acid on cesium carbonate.
Method of purification: Crystallization.
Grades: Pure.
Containers: Kegs.
Uses: Brewing; mineral waters.
Railroad shipping regulations: None.*

Cetaceum. See Spermaceti.

Cetin (Palmitic acid cetyl ester) $C_{15}H_{31}COOC_{16}H_{33}$.
Color and properties: White crystalline wax-like substance. Chief constituent of commercial purified spermaceti.
Constants: M.p. 50°C.; b.p. 360°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By solution from spermaceti.
Grades: Technical.
Containers: Wooden boxes.
Uses: Base for ointments, cerates and emulsions; manufacture of candles, soaps, etc.
Railroad shipping regulations: None.*

Cetraria (Iceland moss).
Color and properties: Gray fibrous bundles.
Chief constituents: Cetraric acid, lichenostearic acid, fumaric acid and lichenine.
Derivation: The thallus of Cetraria islandica; habitat: North America and Europe.
Grades: Technical.
Containers: Bales.
Uses: Medicine (chronic catarrh); food; emulsifier.
Railroad shipping regulations: None.*

Cetyl Alcohol. See Cetylic alcohol.

Cetylacetic Acid. See Stearic acid.

Cetylic Acid. See Palmitic acid.

Cetylic Alcohol (Ethal; Ethol; Cetyl alcohol; Hecdecatylic alcohol; Normal primary hexadecyl alcohol; Palmityl alcohol) $C_{16}H_{33}OH$.
Color and properties: White crystals.
Constants: Sp.gr. 0.8176; m.p. 50°C.; b.p. 344°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By saponifying spermaceti with caustic alkali.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Cevadilla. See Sabadilla.

Ceylon Gelatin. See Agar-agar.

Ceylon Isinglass. See Agar-agar.

Ceylonite. See Spinel.

Ceyssatite. See Diatomaceous earth.

Chabazite. See Zeolites.

Chabert Oil. A mixture of three parts of turpentine oil with one part of bone oil; used in medicine.

Chalcanthite (Blue vitriol, natural) $CuSO_4.5H_2O$.
Deep to sky blue glassy mineral, white or colorless streak, vitreous luster. The intermediate stage in the so-called secondary enrichment. Generally an incrustation but sometimes found as crystals. Is always present in copper-mines waters from which the metal is recovered as copper-cement. Contains 31.8% cupric oxide, 32.1% sulfur trioxide, 36.1% H_2O.
Constants: Sp.gr. 2.12 to 2.30; hardness 2.5.
Occurrence: United States (Nevada, Arizona, Tennessee, California), Germany, Sweden, England, Ireland, Spain, Servia.
Uses: Source of copper.

Chalcedony.
A form of native silica or quartz (q.v.) containing about 1% water and variable amounts of impurities.
Color: White, grayish, blue, creamy yellow, pale brown to dark brown; waxy luster.
Constants: Sp.gr. 2.62 to 2.64; hardness 6.5 to 7.
Uses: Formerly much used for cameos and seals.

Chalcocite (Copper glance; Redruthite) Cu_2S.
Blackish lead-gray mineral, often tarnished blue or green, lead-gray streak, metallic luster. Soft, sectile, more brittle than argentite (q.v.) and differs from bornite (q.v.) in not becoming magnetic on fusion. Contains 79.8% copper, 20.2% sulfur, often with some iron or silver. Is found both as a primary and secondary mineral. Soluble in nitric acid.
Constants: Sp.gr. 5.5 to 5.8; hardness 2.5 to 3.
Occurrence: United States (Connecticut, New Jersey, Nevada, Arizona, Montana, Alaska).
Uses: Important source of copper.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Chalcophanite (Hydrofranklinite) A natural hydrous manganese-zinc oxide $(Mn,Zn)O.2MnO_2.2H_2O$. Occurs in New Mexico.

Chalcopyrite (Copper pyrites; Yellow copper) $CuFeS_2$.

Bright brass-yellow mineral, often tarnished in blue, purple and black hues, greenish-black streak, metallic luster. Differs from pyrite (q.v.) by its inferior hardness and deeper yellow color. Resembles gold when disseminated in minute grains in quartz, but differs in being brittle, soluble in nitric acid, and in having greenish-black streak. Contains 34.5% copper, 30.5% iron, 35.0% sulfur with mechanically intermixed pyrite at times.

Constants: Sp.gr. 4.1 to 4.3; hardness 3.5 to 4.

Occurrence: United States (New York, Pennsylvania, Missouri, Colorado, Arizona, Montana, Utah, Alaska, Nevada, New Mexico, California, Tennessee), Canada, England, Sweden, Germany, Italy, Spain, Australia, Japan.

Uses: The most common and most important copper ore.

Chalcotrichite. See Cuprite.

Chalk.

A natural calcium carbonate composed of the calcareous remains of minute marine organisms. It varies in composition, properties and appearance ranging in color from snow-white through dull-white or grayish and from soft, incoherent and porous to hard and crystalline. It may contain up to 99% calcium carbonate in the form of calcite (q.v.) with silica, quartz, feldspar, zircon, rutile and other minerals as impurities. Phosphatic chalk contains up to 45% calcium phosphate. Glauconitic chalk, an admixture with grains of glauconite. Red chalk contains iron hydroxide.

Chalk, Cliffstone.

One of the English chalks. It is much harder than the ordinary chalks.

Chalk, Drop. See Chalk, prepared.

Chalk, French. A variety of soapstone or steatite (q.v.).

Chalk, Precipitated.

Color and properties: Fine, white microcrystalline powder, the U.S.P. grade containing not less than 98% calcium carbonate. Odorless, tasteless and stable in air.

Constants: M.p.: Decomposes at 825°C. with evolution of carbon dioxide. Density, by derivation (a) 2.9.

Soluble (with effervescence) in dilute acetic, hydrochloric and nitric acids; practically insoluble in water; insoluble in alcohol.

Derivation: (a) By adding a boiling solution of calcium chloride to a boiling solution of sodium carbonate. (b) By passing carbon dioxide through milk of lime.

Grades: Technical; U.S.P.

Uses: Medicine (antacid).

Railroad shipping regulations: None.*

Chalk, Prepared (Drop chalk).

Color and properties: A very fine, white to grayish-white, amorphous powder, often formed in "conical drops." The U.S.P. grade contains not less than 97% calcium carbonate. Odorless, tasteless and stable in air.

Constants: M.p.: Decomposes at 825°C. with evolution of carbon dioxide.

Soluble (with effervescence) in dilute acetic, hydrochloric and nitric acids; practically insoluble in water; insoluble in alcohol.

Derivation: By grinding some form of native calcium carbonate to a fine powder, agitating with water, allowing the coarser particles to settle, decanting the suspension and allowing the fine particles to slowly settle.

Grades: U.S.P.

Uses: Medicine (antacid); tooth powders.

Railroad shipping regulations: None.*

Chalk, Red. See Hematite, red.

Chalybeate Waters.

Ferruginous waters, usually containing from about 0.03 to 0.15% ferrous carbonate.

Chamber Acid.

Sulfuric acid (q.v.) made by the chamber process.

Chamber Process. See Sulfuric acid.

Chamois Mordant.

A pure grade of ferrous acetate or iron acetate liquor (q.v.).

Chamomile. See Anthemis.

Chamomile Oil, German (Camomile oil).

Color and properties: Viscous essential oil of deep-blue color, which by exposure to light and air turns into green and brown; characteristic odor; bitter, aromatic taste.

Constants: Sp.gr. 0.922 to 0.956; acid value 9 to 50; ester value 3 to 33, after acetylation 117 to 155.

Adulterants: Cedar-wood oil which reduces the congealing point. Unadulterated oils become viscous at 15°C. and butyraceous at 0°C.

Solubility in alcohol: In 95% alcohol, usually with separation of paraffin.

Derivation: Distilled from the flower heads of Matricaria chamomilla.

Uses: Flavoring.

Railroad shipping regulations: None.*

Chamomile Oil, Roman.

Color and properties: See Chamomile oil, German.

Chief known constituents: Esters of butyric, angelic and tiglic acids.

Constants: Sp.gr. 0.905 to 0.918 at 15°C.; optical rotation $-2° 30'$ to $+3°$; refractive index 1.442 to 1.457; acid value 1.5 to 14; ester value 214 to 317.

Solubility in alcohol: In 6 to 10 vols. of 70% alcohol; in 1 to 2 vols. of 80% alcohol (occasionally with separation of paraffin).

Derivation: Distilled from the flower heads of Anthemis nobilis.

Uses: Medicine.

Railroad shipping regulations: None.*

Champaca Oil. Fragrant fruity oil distilled from fresh flowers of Michelia champaca or M. congifolia, growing in the Philippines, Java and northern India. A leaf oil is also made. Used in perfumery.

Champaca-wood Oil. See Guaiac wood oil.

Channel Black. See under Blacks, Carbon black.

Charcoal, Activated. See Activated charcoal.

Charcoal, Animal. See Blood charcoal; also Animal black, under Blacks.

Charcoal, Bone. See Animal black, under Blacks.

Charcoal, Mineral.

Color and properties: Soft, fibrous, charcoal-like substance.

Derivation: Found as a surface coating between layers of coal.

Charcoal, Vegetable. See Charcoal, wood; also, under Blacks, Vegetable blacks.

Charcoal, Wood (Decolorizing carbon; Vegetable charcoal).

Derivation: Formerly the chief product, now a by-product of the destructive distillation of wood.

Grades: Technical; U.S.P.

Containers: Barrels.

Uses: Chemical (precipitant in the cyanide process, precipitant of iodine and lead salts from their solutions, catalyst, calcium carbide, decolorizing and filtering medium, absorbent in recovery of volatile solvents, gas absorbent);

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

component of ordinary gun powder and other explosives; fuel; poultry farming; arc light electrodes; decolorizing and purifying oils; artificial leather (solvent recovery); brewing (deodorant); metallurgy; heat insulating compositions; crayons; gasoline from casinghead gas; pharmaceutical preparations; plastics (solvent recovery); refrigeration (gas absorbent); sugar (decolorizing).
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Chardonnet Silk. See Rayon.

Charlton White. See Lithopone.

Chars. See under specific charcoal or black.

Chatterton Compound. A filling material for potheads, coil boxes and the like. It is stated to be composed of gutta-percha, tar and rosin, the percentage of gutta-percha being variable.

Chaulmoogra Oil (Gynocardia oil).
Color and properties: Brownish-yellow oil or soft fat; characteristic odor; somewhat acrid taste.
Chief constituents: Glycerides of chaulmoogric and hydrocarpic acids.
Constants: Sp.gr. 0.940; saponification value 198 to 213; iodine value 96 to 104; acid value 21 to 27.
Soluble in ether, chloroform, benzene, benzine; sparingly soluble in alcohol.
Derivation: Expressed from the seeds of Taraktogenos kurzii.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: Tins; cases.
Uses: Medicine (leprosy).
Railroad shipping regulations: None.*

Chaux de Theil.
A French hydraulic lime containing more than 20% clayey matter.

Checkerberry. See Gaultheria.

Checkerberry Oil. See Gaultheria oil.

Chelandine. See Chelidonium.

Chelerythrine $C_{21}H_{17}O_4N$.
Color and properties: Colorless crystals; poisonous!
Constants: M.p. 203°C.
Slightly soluble in alcohol and ether.
Derivation: By extraction of Chelidonium majus or Sanguinaria canadensis and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (depressant of involuntary muscles).
Railroad shipping regulations: None.*

Chelidonine $C_{20}H_{19}NO_5.H_2O$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 135° to 136°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By extraction of Chelidonium majus and subsequent crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (in form of phosphate, sulfate, tannate, muriate, as diuretic and similar to chelidonium).
Railroad shipping regulations: None.*

Chelidonine Hydrochloride $C_{21}H_{19}NO_5.HCl$.
Color and properties: White crystals.
Soluble in alcohol, ether and water.
Derivation: By the action of hydrochloric acid on chelidonine.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Chelidonium (Celandine; Chelandine; Tetterwort).
Derivation: Perennial herbaceous plant, Chelidonium majus.
Habitat: Europe and United States.
Grades: Technical.
Containers: Bales.
Uses: Medicine (skin diseases, purgative); source of chelidonine.
Railroad shipping regulations: None.*

Chemical Food. Old name for compound syrups containing phosphates of calcium, iron, potassium and sodium.

Chemical Indicators. See Indicator (chemical).

Chemical Red.
A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

"Chemick." A cold dilute solution of bleaching powder (calcium hypochlorite) used in the textile industry.

Chenopodium Oil, American. See Wormseed oil, American.

Chenopodium Oil, Levant. See Wormseed oil, Levant.

Cherry-bark Oil, Wild.
An essential oil distilled from the bark of Prunus virginiana, Mill. It resembles oil of bitter almonds and consists largely of benzaldehyde and hydrocyanic acid.
Constants: Sp.gr. 1.045 to 1.050.
Uses: Medicine; aromatic beverages.
Railroad shipping regulations: None.*

Cherry Bay. See Laurocerasi folia.

Cherry Coal. A variety of bituminous coal which burns with little caking.

Cherry-laurel Leaves. See Laurocerasi folia.

Cherry-laurel Oil.
Color and properties: Pale yellow liquid closely resembling oil of bitter almonds in its properties but distinguishable from it by its slightly different odor. Very poisonous! Hydrocyanic acid content 0.4 to 3.6% (rarely up to 8% and more).
Chief known constituents: Benzaldehyde, hydrocyanic acid, benzaldehyde cyanhydrin.
Constants: Sp.gr. 1.050 to 1.066 (occasionally 1.0457) at 15°C.; optical rotation usually inactive, but occasionally active +0° 12′ to −0° 46′; refractive index 1.540 to 1.543; acid value 1.6 to 2.8.
Solubility in alcohol: In 2.5 to 4 vols. of 60% alcohol (diminishing with age); in 1 to 2 vols. of 70% alcohol.
Derivation: By macerating the leaves of Prunus laurocerasus, L. with water and then distilling with steam.
Containers: Bottles.
Uses: Flavoring; liqueurs.
Railroad shipping regulations: None.*

Chert. A variety of chalcedony (q.v.). This term is also applied to impure flinty rocks.

Chessylite. See Azurite.

Chestnut Extract.
Derivation: By leaching the bark of Castanea sativa, yielding an extract, the composition of whose tannin is unknown.
Grades: Liquid: 25% tannin; powdered: 60% tannin.
Containers: Powdered: 100 lb. bags; liquid: 500 lb. barrels; tank cars.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Chestnut Oak Extract.
Derivation: From Quercus primus. Native of the southern states of the United States.
Grades: 25% tannin.
Containers: Tank cars; wooden barrels.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Tanning industry.
Railroad shipping regulations: None.*

Chewing Gum. Usually consists of chicle gum (q.v.), glucose, powdered sugar, starch and flavoring.

Chian Turpentine.
Color and properties: Thick, tenacious liquid, yellow to green in color with an odor similar to turpentine. Thickens to a translucent, yellowish mass on exposure to air.
Derivation: From Pistacia terebinthus, native to the islands of Chios and Cypress.
Uses: Medicine (treatment of uterine cancer, unofficial).
Railroad shipping regulations: None.*

Chicago Acid. See 1-Amino-8-naphthol-2:4 disulfonic acid.

Chicle Gum (Balata; Tuno gum; Zapota gum).
The dried milky juice from Mimusops globusa and Achras sapota, L.
Mimusops balata Gärtn. (Balata).
Color and properties: Grayish-white, reddish-brown spots and veins; when purified it is an amorphous powder, tasteless; emitting a disagreeable odor when warmed.
Constants: Sp.gr. 1.05; softening point 49°C.
Soluble in ether, petroleum benzine, carbon bisulfide, kerosene and benzene.
Habitat: Mexico, Central America, Africa, West Indies.
Uses: Cheaper grades of chewing gum (q.v.); transmission belts.
Achras sapota L. (Mexican chicle).
Color and properties: Irregular pinkish- to reddish-brown pieces with adhering pieces of bark and bodies of insects when crude. Amorphous, pale-pink powder when purified. Becomes yellowish-brown to brown and very brittle on aging.
Soluble in ether, petroleum, benzine, carbon bisulfide, kerosene and benzene.
Habitat: Mexico.
Uses: Medicated chewing **gums only.**
Railroad shipping regulations: None.*

Chile Niter. See Caliche.

Chile Nitrate. See Caliche.

Chile Saltpeter. See Caliche.

Chilean Niter. See Caliche.

Chilean Niter, Synthetic. See Sodium nitrate BASF and Sodium nitrate, "Hopewell Arcadian."

Chilean Nitrate. See Caliche.

Chilean Nitrate, Synthetic. See Sodium nitrate BASF and Sodium nitrate, "Hopewell Arcadian."

Chilean Saltpeter. See Caliche.

Chilean Saltpeter, Synthetic. See Sodium nitrate BASF and Sodium nitrate, "Hopewell Arcadian."

Chili Niter. See Caliche.

Chili Nitrate. See Caliche.

Chili Saltpeter. See Caliche.

Chillies. See Capsicum.

Chimaphila (Pipsissewa; Prince's pine; Bitter wintergreen; Rheumatism weed; Ground holly; Pyrola; Pine tulip).
Dried leaves of Chimaphila umbellata.
Habitat: Europe, Asia and North America.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (for feeble diuretic action).
Railroad shipping regulations: None.*

China Bark. See Quillaja.

China Clay. See Kaolin.

China Oil. See Peru balsam.

China Orange. See Orange peel, sweet.

China-wood Oil. See Tung oil.

China Works Mold Oil. An oil having similar properties to those given under "transformer oil" and "summer black oil" is stated to be suitable for this purpose.

Chinaldine. See Quinaldine.

Chinaphenine. See Quinaphenine.

Chinaphthol. See Quinaphthol.

Chineonal. See Quinine diethylbarbiturate.

Chinese Anise. See Ilicium.

Chinese Bean Oil. See Soya-bean oil.

Chinese Blistering Flies. See Cantharides.

Chinese Blue. See Iron blues.

Chinese Cinnamon Oil. See Cassia oil.

Chinese Gelatin. See Agar-agar.

Chinese Glue. An alcoholic solution of shellac.

Chinese Isinglass. See Agar-agar.

Chinese Oil. See Peru balsam.

Chinese Red. See Chrome red.

Chinese Root. See Galanga.

Chinese Tree Wax. See Chinese wax.

Chinese Wax (Insect wax; Chinese tree wax; Vegetable spermaceti).
Color and properties: White to yellowish-white solid; nearly odorless and tasteless. Must not be confused with Japan wax (q.v.).
Chief constituent: Ceryl cerotate.
Constants: Sp.gr. 0.970; m.p. 80° to 83°C.; iodine number 1.4; saponification number 80 to 93.
Soluble in alcohol, chloroform, benzene and naphtha.
Derivation: Secreted by an insect (Coccus ceriferus). The wax is deposited on the branches of some trees and is removed by hand and then melted in boiling water to remove dirt, bark, etc.
Method of purification: Filtration.
Grades: Crude.
Containers: Burlap bags; wooden barrels.
Uses: Fine candles; coating interior and exterior of vegetable tallow candles; medicine; paper size; furniture, leather, and shoe polishes; treating cotton fabrics.
Railroad shipping regulations: None.*

Chinese White. See Zinc oxide.

Chinese White Copper. An alloy composed of about 40% copper, 31% nickel, 25% zinc and 2% iron.

Chinese-wood Oil. See Tung oil.

Chinic Acid. See Quinic acid.

Chinidine. See Quinidine.

Chinium. See Quinium.

Chinizarin. See Quinazarin.

Chinoidine. See Quinoidine.

Chinoline. See Quinoline.

Chinone. See Quinone.

Chinosol. See Quinosol.

Chinotropin. See Hexamethylenetetramine quinate.

Chionanthus (Fringe tree bark; Poison ash; Flowering ash).
Dried bark of root of Chionanthus virginica.
Habitat: Southern United States.
Grades: N.F.
Uses: Medicine (liver conditions).

Chirata (Chiretta; Bitter-stick; East Indian balmony).
Derivation: The dried plant, Swertia chiraytia.
Habitat: Northern India.
Grades: Technical.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Bales.
Uses: Medicine (bitters).
Railroad shipping regulations: None.*

Chiretta. See Chirata.

Chittam Bark (Chittem bark; Chittim bark). See Cascara sagrada bark.

Chloanthite $(CoNi)As_2$.
Cobalt and nickel are present in varying ratios both in this mineral and in smaltite (q.v.). Thus it is impossible to definitely classify them separately since they graduate into each other.

Chloral (Trichloroacetic aldehyde; Trichloracetic aldehyde) CCl_3CHO.
Color and properties: Colorless, mobile, oily liquid; penetrating odor.
Constants: Sp.gr. 1.5121; m.p. —57.5°C.; b.p. 97.7°C.
Soluble in alcohol, ether and chloroform; combines with water forming chloral hydrate.
Derivation: By the chlorination of alcohol and subsequent distillation.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis; chloral hydrate.
Railroad shipping regulations: None.*

Chloralamide. See Chloral formamide.

Chloral Amylene Hydrate. See Dormiol.

Chloral Formamide (Chloralamide; Formamidated chloral) $C_3H_4Cl_3NO_2$.
Color and properties: Colorless, lustrous crystals, odorless, slightly bitter taste.
Constants: M.p. 114° to 115°C.
Soluble in water (hydrolyzes at 60°C.), alcohol, ether and glycerol.
Derivation: Interaction of formamide and anhydrous chloral.
Containers: Amber-colored bottles.
Uses: Medicine (hypnotic similar to chloral hydrate).
Railroad shipping regulations: None.*

Chloral Hydrate ("Knockout drops"; Trichloroacetic aldehyde) $CCl_3CH(OH)_2$.
Color and properties: Transparent, colorless crystals; poisonous!
Constants: Sp.gr. 1.901; m.p. 52°C.; b.p. 97.5°C.
Soluble in water, alcohol, chloroform and ether.
Derivation: By the action of 1/5 of its volume of water on chloral.
Method of purification: Crystallization.
Grades: Technical, U.S.P.
Containers: 1, 5, 10, 25 lb. bottles; 25 lb. jars; 100 lb. paraffined drums.
Uses: Medicine (to depress the centers of consciousness); liniments.
Railroad shipping regulations: None.*

Chloral Hydrate Antipyrine. See Hypnal.

Chloralimide CCl_3CHNH.
Color and properties: Colorless, long crystalline needles; odorless. Not to be confused with chloral formamide (q.v.).
Constants: M.p. 166°C. (approximately).
Soluble in alcohol, ether, chloroform and oils; insoluble in water.
Derivation: Heating chloral formamide on steam bath.
Uses: Medicine (stated to be hypnotic, unofficial).
Railroad shipping regulations: None.*

Chloralose (Glucochloral, anhydrous) $C_8H_{11}Cl_3O_6$.
Color and properties: Small crystals; bitter, disagreeable taste. Active hypnotic on lower animals but dangerous as a practical hypnotic. May produce the following symptoms: delirious intoxication, vomiting, involuntary discharges of urine, tremors, partial general paralysis, slowing of pulse and enfeebled heart action.
Constants: M.p. 185°C.
Uses: Medicine (hypnotic, unofficial).
Railroad shipping regulations: None.*

Chloramine-T. See Sodium para-toluenesulfonchloramine.

Chloranil (Tetrachloroquinone) $C_6Cl_4O_2$.
Color and properties: Yellow leaflets.
Constants: M.p. 285°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: By the interaction of phenol or aniline with potassium chlorate and hydrochloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron drums.
Uses: Oxidizer in manufacturing coal-tar dyes.
Railroad shipping regulations: None.*

Chloranthrene Yellow. See Flavanthrene.

Chlorapatite. See Apatite.

Chlorargyrite $AgCl$.
One of the cerargyrite or natural silver haloid (q.v.) group. Pearl gray or greenish in color, darkens on exposure to light, becoming violet, brown or black, shining white streak. Contains 75.3% silver. Insoluble in acids, soluble in ammonia.
Constants: Sp.gr. 5 to 5.5; hardness 1 to 1.5.
Occurrence: United States (Colorado, Nevada, Idaho, Utah, Arizona, New Mexico), Mexico, Chile, Australia, Bolivia, Germany, Norway.

Chlorazene. See Sodium para-toluenesulfonchloramine.

Chlorazotic Acid. See Aqua regia.

Chlorbenzene. See Chlorobenzene.

Chlorbenzol. See Chlorobenzene.

Chlorethane. See Ethyl chloride.

Chloretone (Acetone chloroform; Chlorobutanol; Tertiary trichlorobutyl alcohol; Anesin) $CCl_3(CH_3)_2COH \cdot \frac{1}{2}H_2O$.
Color and properties: Colorless crystals; camphor-like odor and taste. Forms a mass or liquid when triturated with antipyrine, phenol or menthol.
Constants: Fusing point 80° to 81°C.
Soluble in alcohol, ether, benzine, acetone, chloroform, oils, glycerol and glacial acetic acid; slightly soluble in water.
Derivation: By the action of potassium hydroxide on a cooled mixture of acetone and chloroform.
Grades: Technical; pure; solution (known as anesin).
Containers: Tins; glass bottles.
Uses: Medicine (anesthetic in physiological laboratory, tetanus, local antiseptic and anesthetic, diseases of mucous membrane, gastralgia, vomiting, sea-sickness, unofficial).
Railroad shipping regulations: None.*

Chloric Ether (Spirit of chloroform).
A solution of 60 cc. of chloroform in sufficient alcohol to make 1,000 cc. by volume.
Containers: Dark, amber-colored bottles.
Uses: Medicine (formerly used as a general anesthetic but now to alleviate gastro-intestinal spasms).
Railroad shipping regulations: Red label.

Chloride of Lime. See Calcium hypochlorite.

Chlorinated Lime. See Calcium hypochlorite.

Chlorinated Paraffin. See Chlorocosane.

Chlorinated Soda. See Javelle water.

Chlorine (Liquid bleach) Cl_2.
Color and properties: Heavy, greenish-yellow gas or liquid; poisonous!
Constants: Gas: Sp.gr. 2.491; m.p. —102°C.; b.p. —33.6°C.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in water and alkalis.

Derivation: By the electrolysis of sodium chloride in solution. The chlorine is released at the positive electrode. The chlorine is either liquefied by compression in steel cylinders or employed at once for making bleach or bleaching powder, or for chlorinating organic substances.

Grades: Technical.

Containers: 100, 150 lb. steel cylinders; single unit tank cars of 30,000 lbs.; multi-unit tank cars of 15 one-ton units.

Uses: Organic synthesis; chlorination; hydrochloric acid; textile bleaching liquor; water purification; military poison gas; metallurgy (recovery of gold and silver from their ores, extraction of copper, lead and zinc from mixed ores, separation of tungsten and vanadium from their ores, detinning scrap white cast iron and dezincing scrap galvanized iron obtaining, as by-products, tin and zinc chlorides, respectively, free of iron, when using gaseous chlorine, absolutely free of water); inks; paper (bleaching); rubber substitutes; chlorinated rubber; water purification.

Railroad shipping regulations: Green gas label.

Chlorinol Oil. Trade name for a product specially adapted for the textile industry, principally wool, where it is employed as a solvent. It removes mineral oil and similar stains, and is perfectly soluble in water. It will combine with soap, soda, etc.

Chloritoid.

$H_2(FeMg)Al_2SiO_7$, Mg is not always present.

One of a group of silicate minerals known as brittle micas (q.v.), which may be classed as transition products from the micas to the chlorite minerals. Color, dark or greenish-gray, gray or greenish-black.

Constants: Sp.gr. 3.52 to 3.57; hardness 6.5.

Occurrence: United States (Michigan), Russia, France, Belgium, Shetland Isles, Canada.

Chloroacetic Acid $CH_2ClCOOH$.

Color and properties: Colorless to light-brownish crystals, very deliquescent and caustic to the skin.

Constants: Sp.gr. 1.370 at 70°C.; crystallizing point, alpha form 61.0° to 61.7°C., beta form 55.5° to 56.5°C.; boiling range 186° to 191°C.

Soluble in water, alcohol and ether.

Derivation: By the action of chlorine on acetic acid in the presence of acetic anhydride, phosphorus, or sulfur.

Grades: Technical; medicinal.

Containers: Wooden barrels; kegs; earthenware jars.

Uses: Organic synthesis; medicine; corn and wart remover.

Railroad shipping regulations: None.*

Chloroacetone (Chlorinated acetone) CH_3COCH_2Cl.

Color and properties: Colorless liquid; pungent odor.

Constants: Sp.gr. 1.162; b.p. 119°C.

Soluble in alcohol, ether and chloroform; insoluble in water.

Derivation: By the chlorination of acetone.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums.

Uses: Organic synthesis; military poison gas.

Railroad shipping regulations: None.*

Chloroacetophenone (Phenacylchloride) $C_6H_5COCH_2Cl$.

Color and properties: White crystals.

Constants: M.p. 56°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: Action of chloroacetylchloride on benzene in presence of aluminum chloride.

Method of purification: Distillation and recrystallization.

Grades: C.P.; technical.

Containers: Glass bottles.

Uses: War gas (lachrymator).

Railroad shipping regulations: Tear gas label.

Chloroacetyl Chloride $CH_2ClCOCl$.

Color and properties: Water-white liquid.

Constants: Sp.gr. 1.495 at 0°C.; b.p. 105° to 106°C.; decomposes in water.

Derivation: (a) By the action of chlorine on acetyl chloride in sunlight. (b) By dropping phosphorus trichloride on chloroacetic acid.

Method of purification: Distillation.

Containers: Glass bottles; carboys.

Uses: Preparation of chloroacetaphenone (tear gas).

Railroad shipping regulations: None.*

2-Chloroanthraquinone.

Color and properties: Resemble in general those of anthraquinone and 2-methylanthraquinone.

Constants: M.p. 211°C.

Derivation: Prepared by condensing phthalic anhydride and chlorobenzene in the presence of anhydrous aluminum chloride to form para-chlorobenzoylbenzoic acid. Ring closure of the intermediate acid is brought about by heating in sulfuric acid solution.

Containers: Similar to those used for anthraquinone and 2-methylanthraquinone.

Uses: Starting material for certain vat dyes.

Railroad shipping regulations: None.*

Chloroazotic Acid. See Aqua regia.

Chlorobenzal. See Benzyl dichloride.

Chlorobenzanthrone $C_{17}H_9ClO$.

Color and properties: Yellow needles, all isomers.

Constants: 2- or 3-chlorobenzanthrone; m.p. 129° to 129.5°C.; 8-chlorobenzanthrone; m.p. 174°C.

Soluble in alcohol, benzene, toluene, acetic acid, etc.

Derivation: (a) From benzanthrone in acetic acid solution by treatment with chlorine. (b) From benzanthrone in water suspension by treatment with chlorine.

Method of purification: Crystallization from acetic acid.

Grades: Technical.

Containers: Wooden barrels.

Uses: Dyes.

Railroad shipping regulations: None.*

Chlorobenzene (Chlorobenzol; Chlorbenzene; Chlorbenzol; Phenyl chloride) C_6H_5Cl.

Color and properties: Clear liquid.

Constants: Sp.gr. 1.1064; m.p. —44.9°C.; b.p. 132°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: (a) By passing dry chlorine into benzene to which a small aluminum-mercury couple is added as a carrier. Action is stopped when the additional weight corresponds to the replacement of one hydrogen atom by one of chlorine. The liquid is neutralized with caustic soda, dehydrated over calcium chloride and finally recovered by distillation. (b) By passing chlorine into benzene in presence of molybdenum chloride.

Method of purification: Rectification.

Grades: Technical.

Containers: 90, 500, 1,000 lb. drums; tank cars.

Uses: Phenol; picric acid; dinitrochlorobenzene; ortho- and para-nitrochlorobenzene; ortho- and para-dichlorobenzenes; dyes (sulfur blacks and browns); synthesis of military poison gases.

Fire hazard: Inflammable liquid.*

Railroad shipping regulations: Red label.

Chlorobenzol. See Chlorobenzene.

Chlorobutanol. See Chloretone.

Chlorocosane (Chlorinated paraffin).

Color and properties: Light yellow to light amber, clear, thick, oily liquid; odorless; stable in air. Contains 30 to 40% chlorine. Yields

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

chlorine if boiled with aniline; also, with much difficulty, if boiled with alkalis.
Constants: Sp.gr. 1.00 to 1.07 at 25°C.
Derivation: By passing chlorine through melted paraffin at 125° to 140°C. until its weight increases 50%, agitating with 5% of its weight of dry sodium carbonate and filtering.
Uses: Solvent for dichloramine.
Railroad shipping regulations: None.*

1-Chloro-2:6-dinitrobenzene-4-sulfonic Acid, Potassium Salt $C_6H_2Cl\ (NO_2)_2\ SO_3K$.
Color and properties: White, flaky crystals.
Constants: M.p. 300°C.
Slightly soluble in water.
Derivation: Sulfonation and dinitration of chlorobenzene.
Method of purification: Recrystallization.
Grades: Technical, 95% (approximately 50% paste).
Containers: Wooden barrels and kegs.
Uses: Intermediate for Schultz dye No. 542; manufacture of 1-chloro-2-amino-6-nitrophenol-4-sulfonic acid, 1-chloro-2:6-diaminobenzene-4-sulfonic acid, 2-amino-6-nitrophenol-4-sulfonic acid, 2:6-diaminophenol-4-sulfonic acid.
Fire hazard: Inflammable when dry.*
Railroad shipping regulations: None in paste form.*

Chloroethane. See Ethyl chloride.

Chloroethylene Chloride. See Ethylene chlorochloride.

Chloroform (Trichloromethane; Formyl trichloride; Chloroform U.S.P.; Methenyl trichloride) $CHCl_3$.
Color and properties: Clear, colorless, highly refractive, volatile liquid; characteristic odor; non-inflammable.
Constants: Sp.gr. 1.49887; m.p. −63.2°C.; b.p. 61.20°C.
Miscible with alcohol, ether, benzene, benzine, fixed and volatile oils; slightly soluble in water.
Derivation: By the reaction of chlorinated lime with acetone.
Method of purification: Rectification.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5, 7 lb. bottles in cases; 1, 5, 10, 25 lb. tins; 50, 120, 650 lb. drums.
Uses: Solvent; anesthetic; acetone chloroform.
Railroad shipping regulations: None.*

Chloroformum, U.S.P. See Chloroform.

Chlorohydric Acid. See Hydrochloric acid.

Chlorohydrin (Alpha-propylenechlorohydrin; Asymmetric propylene chlorohydrin; Chloropropyleneglycol) $CH_2ClCH(OH)CH_2(OH)$.
Color and properties: Yellowish, syrupy liquid.
Constants: Sp.gr. 1.325.
Soluble in water, alcohol and ether.
Derivation: By the action of hydrochloric acid on glycerol.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis; explosives.
Railroad shipping regulations: None.*

Chlorol.
A disinfectant consisting of an aqueous solution of copper sulfate, mercuric chloride, sodium chloride and hydrochloric acid.
Railroad shipping regulations: None.*

Chlorolin.
A disinfectant said to contain about 20% of a mixture of mono- and trichlorophenols.
Railroad shipping regulations: None.*

Chloro-ortho-metanilic Acid, Para- $C_6H_3NH_2SO_3.HCl$.
Color and properties: Colorless needles.
Soluble in water.
Derivation: From para-nitrochlorobenzene-metasulfonic acid by reduction and usual precipitation with acid.
Grades: Technical.
Containers: Wooden barrels or steel drums.
Uses: Azo dyes for wools and lakes.
Railroad shipping regulations: None.*

Chloromethane Acid. See Methyl chloride.

Chloromethylchloroformate (Palite) $ClCOOCH_2Cl$. A military poison gas used in the late war.

Chloromethylmenthyl Ester. See Forman.

Chloronitrobenzenes $C_6H_4Cl(NO_2)$
(a) Meta-chloronitrobenzene.
(b) Ortho-chloronitrobenzene.
(c) Para-chloronitrobenzene.
Color and properties: (a) Yellowish crystals; (b) Yellow liquid; (c) Yellowish crystals.
Constants: (a) Sp.gr. 1.534; m.p. 44°C.; b.p. 236°C.; (b) Sp.gr. 1.368; b.p. 245.5°C.; m.p. 32.5°C. (c) Sp.gr. 1.520; m.p. 83°C.; b.p. 242°C.
(a) Soluble in alcohol, ether, chloroform and benzene. (b) Soluble in alcohol and benzene. (c) Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By chlorinating nitrobenzene in presence of iodine. (b) (c) By nitrating chlorobenzene.
Method of purification: (a) (c) Recrystallization. (b) Rectification.
Grades: Technical.
Containers: (a) Wooden kegs; (b) Iron drums; (c) Wooden kegs; tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Chloronitrobenzol, Meta- Ortho- and Para-. See Chloronitrobenzenes.

Chloronitrous Acid. See Aqua regia.

Chloro-ortho-aminophenol, Para- $C_6H_3OHNH_2Cl$.
Color and properties: Light brown crystals.
Constants: M.p. 131° to 134°C.
Soluble in dilute mineral acid or dilute alkaline solution.
Derivation: Reduction of para-chloro-ortho-nitrophenol.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels or kegs.
Uses: Dye intermediates.
Railroad shipping regulations: None.*

Chloro-ortho-nitrophenol, Para-, Sodium salt $C_6H_3ONaNO_2Cl$.
Color and properties: Red needle crystals, with one molecule of water of crystallization.
Soluble in hot water.
Derivation: Nitration of para-dichlorobenzene followed by hydrolysis.
Method of purification: Recrystallization.
Grades 90% anhydrous sodium salt, containing 80% base.
Containers: Wooden barrels and kegs.
Uses: Dye intermediate; manufacture of para-chloro-ortho-aminophenol.
Railroad shipping regulations: None.*

Chloro-para-nitroaniline, Ortho- $C_6H_3NO_2NH_2Cl$.
Color and properties: Yellow needles.
Constants: M.p. 107°C.
Soluble in alcohol, benzene, ether; slightly soluble in water and strong acids.
Derivation: (a) From 1:2-dichloro-4-nitrobenzene by heating with alcoholic ammonia. (b) From the chlorination of para-nitroaniline in acid solution.
Method of purification: Recrystallization.
Grades: Technical.
Uses: As intermediate in the manufacture of dyes.
Railroad shipping regulations: None.*

Chlorophenols.
(a) Ortho-chlorophenol.
(b) Para-chlorophenol.
(c) Trichlorophenol (Omal).
Color and properties: (a) A liquid with un-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

pleasant, penetrating odor; (b) White crystals with unpleasant penetrating odor; (c) Needles, soluble in alcohol and ether.
Constants: (a) B.p. 175°C.; solidifying point 7°C. (b) M.p. 37°C.; b.p. 217°C. (c) M.p. 68°C.; b.p. 244°C.
Uses: Medicine; dyes; germicides. Para-chlorophenol has marked tubercle bacillicidal properties.
Railroad shipping regulations: None.*
See also Chlorolin and Menthorol.

Chlorophthalic Acid $C_6H_3Cl(COOH)_2$.
Color and properties: Colorless crystals.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the chlorination of phthalic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Chlorophyl. See Chlorophyll.

Chlorophyll (Chlorophyl; Leaf-green).
The green coloring-matter contained in plants. Its function is the absorption from the air and decomposition of the carbon dioxide into oxygen and organic matter. See also chlorophyllan and chlorophyllin.
Derivation: Obtained from plants by alcoholic extraction.
Uses: Coloring confectionery and liqueurs.

Chlorophyllan. The green crystalline product obtained as a residue by evaporating an alcoholic extract of chlorophyll.

Chlorophyllin. The coloring-principle of chlorophyll.

Chloropicrin. See Nitrotrichloromethane.

Chloroplatinic Acid (Platinic chloride) $H_2PtCl_6.H_2O$.
Color and properties: Red-brown crystals.
Constants: Sp.gr. 2.431; m.p.: Decomposes.
Soluble in water, alcohol and ether.
Derivation: By solution of platinum in aqua regia, evaporation and crystallization.
Grades: Technical; pure, reagent. Usually sold under the name platinum chloride or platinic chloride.
Containers: Glass bottles.
Uses: Electroplating; platinizing pumice and the like for catalysts; etching zinc for printing; platinum mirrors; indelible ink; ceramics (producing fine color effects on high-grade porcelain); microscopy; chemical reagent; preparing baths for the toning of photographical prints.
Railroad shipping regulations: None.*

Chloropropyleneglycol. See Chlorohydrin.

Chloropyrine. See Hypnal.

Chlorospinel. See Spinel.

Chlorosulfonic Acid SO_2ClOH.
Color and properties: Brown, oily, corrosive liquid.
Constants: Sp.gr. 1.784; b.p. 82°C.
Soluble in water and alcohol.
Derivation: By treating sulfur trioxide or fuming sulfuric acid with hydrochloric acid.
Grades: Technical.
Containers: 170 lb. carboys; 1,600 lb. drums; 8,000 gal. tank cars.
Uses: Organic preparations, especially saccharin; military poison gas.
Railroad shipping regulations: White label.

Chlorotoluene, Omega-. See Benzyl chloride.

Chlorotoluene-para-sulfonic Acid, Ortho-.
Color and properties: White glistening plates.
Soluble in hot water.
Derivation: Chlorination of toluene-para-sulfonic acid.
Method of purification: Recrystallization from water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Chloro-5-toluidine-4-sulfonic Acid $C_7H_8ClNO_3S$.
Color and properties: Fine white crystals.
Soluble in dilute caustic solution.
Derivation: From ortho-chlorotoluene-para-sulfonic acid by nitration and subsequent reduction.
Method of purification: Recrystallization of its sodium salt.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Chlorotoluol, Omega-. See Benzyl chloride.

Chocolate. See Cacao products.

Chocolate Fat. Cacao butter (q.v.) is the true chocolate fat and the highest-grade chocolates contain it exclusively. Substitutes are used, to a greater or lesser degree, in the lower-grade chocolates. These substitutes usually consist of vegetable fats, such as palm-nut or coco-nut stearin.

Chocolate Varnish. An alcoholic solution of gum benzoin and a resin. It may be used for hardening chocolate, thus preventing its turning white.

Chocolite. A chocolate-colored variety of garnierite (q.v.) containing iron.

Choke Cherry. See Prunus virginiana.

Choleic Acid. See Taurocholic acid.

Choleinic Acid. See Taurocholic acid.

Cholepyrrhin. See Bilirubin.

Cholesterin. See Cholesterol.

Cholesterol $C_{26}H_{43}OH.H_2O$.
Color and properties: Unctuous white, pearly scales.
Constants: Sp.gr. 1.067; m.p. 148.5°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From gall, brain and vegetable fats.
Grades: Technical.
Containers: Tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Cholesterol Pitch. See Stearin and fatty acid pitches.

Choleval.
Color and properties: Brownish-black, lustrous powder. A colloidal silver preparation using sodium cholate as the protective colloid. Contains 10% silver.
Soluble in water.
Uses: Medicine (antibacterial, unofficial). See also Silver, colloidal.
Railroad shipping regulations: None.*

Choliaic Acid. See Taurocholic acid.

Cholic Acid. See Glycholic acid.

Chondrus (Carragheen; Irish moss; Pig-wrack; Pearl moss; Killeen; Rock-salt moss).
Dried plant of sea weed, Chondrus crispus.
Habitat: Irish coast; New England.
Grades: Technical; N.F.
Containers: Burlap bags.
Uses: Nutrient; demulcent; emulsifier; leather dressing.
Railroad shipping regulations: None.*

Chop Nut. See Physostigma.

Chromaventurine.
Color and properties: A green pigment which is essentially a glass, colored by chromic oxide.
Derivation: By fusing together 250 parts iron-free quartz sand, 100 parts soda ash, 50 parts

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

calcium carbonate, and 40 parts potassium bichromate.

Chromax Castings. Ferrous alloys containing besides the iron 35% nickel and 15% chromium.

Chrome Alum. See Chromium-potassium sulfate.

Chrome Glue. See Glue and gelatin.

Chrome Greens. This term properly refers to chromic oxide (q.v.) when used as a paint pigment. There are, however, several other green pigments containing chromium. Of these, some of the better known are: Guignet's green, emerald green, Turkish green, leaf green, Arnaudan's green, Plessy's green, Schnitzer's green, chromaventurine.

Chrome-iron Ore. See Chromite.

Chrome Orange. An orange pigment made by boiling chrome yellow with calcium or sodium hydroxide. The resultant product is basic lead chromate, formula $PbCrO_4.PbOH_2O$. Incompatible with sulfide pigments. See also Chrome red.

Chrome Red (Chinese red; American vermilion; Austrian cinnabar; Derby red; Persian red; Victoria red).

A paint pigment consisting of basic lead chromate which corresponds to the formula $\mathbf{PbCrO_4.PbO.H_2O}$. It is a fairly bright red, of good body, working well in oil, but is darkened by sulfur and hydrogen sulfide.

Derivation: (a) By digesting white lead with potassium bichromate and caustic soda. (b) By boiling chrome yellow (q.v.) with caustic soda or calcium hydroxide.

Note: Chrome red can also be imitated by coloring white lead, orange lead, or barytes with certain of the coal-tar dyes, e.g., eosine.

Chrome Steel. See Iron and steel (Ferrum).

Chrome Yellows (Leipzig yellow; Cologne yellow; Paris yellow; Primrose chrome; Pale chrome; Middle chrome; Deep chrome; Citron yellow; Lemon chrome; Lemon yellow; Baryta yellow; Permanent yellow; Yellow ultramarine; Steinbüller yellow; Jaune d' Outremer).

Chrome yellows are pigments consisting of the chromates of lead, zinc or barium. The one most largely used is lead chromate. (See Lead chromate, neutral.)

Lead chromate is a brilliant deep yellow which mixes well with oil and has great covering power. It is darkened by sulfur and hydrogen sulfide and is acted upon by caustic alkali which converts it to the basic chromate giving either a red or orange color,—chrome red (q.v.) and chrome orange (q.v.). Lead chromate is prepared by the action of potassium bichromate on the acetate, nitrate or sulfate of the metal but a wide range of shades may be obtained either by precipitating a portion of the metal as sulfate or by mixing the sulfate with the chromate in the grinding mill.

Zinc chromate is a light lemon color, of fairly good covering power, is permanent, can be mixed with other pigments, and is unaffected by sulfur or hydrogen sulfide. It is soluble in mineral acids and is decomposed by caustic alkali. It is used to a considerable extent in interior and flat wall paints and to some extent by artistic painters.

Barium chromate is a pale lemon yellow color and is the most stable of all the chrome yellows. It is used in oils and frescos but is less suitable for water colors.

Chrometan. A preparation used in chrome tanning. It contains chromium oxide.

Chromic Acid (Chromium trioxide; Chromic anhydride) CrO_3.

Color and properties: Reddish-brown crystals.

Constants: Sp.gr. 2.67 to 2.82; m.p. 196°C.

Soluble in water and ether.

Derivation: Hydrochloric or sulfuric acid is added to a solution of sodium bichromate and the product recovered by crystallization; also electrolytically.

Method of purification: Recrystallization.

Grades: Technical; C.P.; U.S.P.

Containers: Technical: 25 lb. cans; 100, 220 lb. cases; 100, 200 lb. drums. U.S.P.: ¼, 1, 5 lb. bottles or tins; 25 lb. jars.

Uses: Chemicals (chromates, oxidizing agent, catalysts); intermediates (oxidizing agent); medicine (astringent and germicide); electric cells; ceramic glazes; colored glass; printing and lithographing inks; tanning; paints; rubber pigment; textile mordant; chromium plating.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Chromic Anhydride. See Chromic acid.

Chromic Chloride (Chromium chloride; Chromium sesquichloride) $CrCl_3$ or $CrCl_3.6H_2O$.

Color and properties: Bluish-violet, crystalline powder.

Constants: Sp.gr. 2.757; b.p. 1,200° to 1,500°C.

Anhydrous: Insoluble in water, but a trace of chromous chloride or stannous chloride will cause it to go into solution. Hydrous: Soluble in water and alcohol.

Derivation: Anhydrous: Chlorine is passed over a heated mixture of chromic oxide and carbon. Hydrous: By the action of hydrochloric acid on chromium hydroxide.

Grades: Technical; C.P.

Containers: 1, 5 lb. bottles; 450 lb. wooden barrels.

Uses: Chromium salts; intermediates; textile mordant; chromium plating.

Railroad shipping regulations: None.*

Chromic Fluoride (Chromium fluoride) $CrF_3.4H_2O$.

Color and properties: Fine, green crystalline powder.

Constants: Sp.gr. 3.78.

Soluble in water and acids; insoluble in alcohol.

Derivation: By the interaction of chromium hydroxide and hydrofluoric acid.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: 1 lb. bottles; 400 lb. wooden barrels.

Uses: Printing and dyeing woolens; coloring and hardening marble.

Railroad shipping regulations: None.*

Chromic Hydrate. See Chromic hydroxide.

Chromic Hydroxide (Chromium hydroxide; Chromium hydrate) $Cr(OH)_3$.

Color and properties: Green, gelatinous precipitate.

Insoluble in water.

Derivation: By adding a solution of ammonium hydroxide to the solution of a chromium salt.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden kegs.

Uses: Chromium salts and chromites.

Railroad shipping regulations: None.*

Chromic Oxide (Chrome green; Chromium oxide) Cr_2O_3.

Color and properties: Bright-green, crystalline powder.

Constants: Sp.gr. 5.04; m.p. 1,990°C.

Insoluble in water and acids.

Derivation: (a) By heating chromium hydroxide. (b) By heating dry ammonium bichromate. (c) By heating potassium bichromate with sulfur and washing out the potassium sulfate.

Grades: Technical; C.P.

Containers: 1 lb. bottles; 100 lb. kegs; 300 lb. barrels.

Uses: Metallurgy; paint pigment; ceramics.

Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Chromic Phosphate (Chromium phosphate; Arnaudon's green)
(a) $CrPO_4.6H_2O$.
(b) $CrPO_4.4H_2O$.
Color and properties: (a) Violet crystals. (b) Green crystals.
Soluble in acids; insoluble in water.
Derivation: (1) By the interaction of solutions of chromium chloride and sodium phosphate. (2) By mixing cold solutions of chrome alum and disodium hydrogen phosphate. Violet amorphous powder is formed which becomes crystalline on contact with water. On boiling it is converted into green crystalline hydrate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Paint pigment.
Railroad shipping regulations: None.*

Chromic Sulfate (Chromium sulfate)
(a) $Cr_2(SO_4)_3$.
(b) $Cr_2(SO_4)_3.15H_2O$.
Color and properties: (a) Violet or red powder. (b) Dark-green amorphous scales.
Constants: Sp.gr. (a) 3.012. (b) 1.867.
(a) Insoluble in water and acids. (b) Soluble in water.
Derivation: By the action of sulfuric acid on chromium hydroxide, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 5, 10, 25 lb. tins; 500 lb. barrels.
Uses: Textile industries; green paints and varnishes; green ink; ceramics (glazes, green effects); tanning.
Railroad shipping regulations: None.*

Chromite (Chrome-iron ore) $FeCr_2O_4$ or $FeO.Cr_2O_3$. Often with some replacement of the ferrous oxide by magnesia and chromic oxide by alumina.
Black mineral with dark-brown streak and submetallic to metallic luster. Usually found as grains disseminated in peroditite rocks and the serpentines derived from them. Resembles magnetite but can be distinguished from it by color of streak and poor magnetic properties. Varying analyses are reported averaging 45% Cr_2O_3 but some authorities give 68. Insoluble in acids.
Constants: Sp.gr. 4.3 to 4.6; hardness 5.5.
Occurrence: United States (Maryland, Pennsylvania, New Jersey, North Carolina, Vermont, California), Syria, Shetlands, Norway, France, Germany, New Caledonia, Asia Minor.
Uses: Ore of chromium (only commercial source of chromium and its compounds); metallurgical (chrome steel, ferrochrome); refractories (chrome bricks and furnace linings).

Chromitite. Mineral found in Servia to which the formula $FeCrO_3$ has been given.

Chromitron. Trade name for a product which is claimed to be much superior to rouge, emery and like materials for polishing and sharpening razor blades and stainless steel knives, etc.

Chromium Cr.
Color and properties: Shining, steel-gray metal.
Constants: Sp.gr. 6.92; m.p. 1,520°C.; b.p. 2,200°C.
Soluble in acids.
Derivation: By reduction of the oxide with aluminum filings by the Goldschmidt process.
Grades: Technical.
Containers: Cars; barrels.
Uses: Metallurgy; chromium salts.
Railroad shipping regulations: None.*

Chromium Acetate. See Chromous acetate.

Chromium Chloride. See Chromic chloride.

Chromium Copper. A copper-chromium alloy containing 10% chromium. Used in manufacture of hard steels for increasing elasticity.

Chromium Fluoride. See Chromic fluoride.

Chromium Hydrate. See Chromic hydroxide.

Chromium Hydroxide. See Chromic hydroxide.

Chromium Oxide. See Chromic oxide.

Chromium Phosphate. See Chromic phosphate.

Chromium Plating.
A uniform coating of metallic chromium deposited electrolytically over the surface of a metallic cathode. As commercially carried on today, chromium is deposited from aqueous solutions of chromic acid (CrO_3), using insoluble anodes. The metal content of the bath is replenished by additions of chromic acid to the solution. The coating has the properties of the element but the methods of deposition and the use of intermediate plates between the base metal and the layer of the chromium vary, depending on the purpose for which the article plated is to be used.

Commercial plating is done in steel tanks lined with a material resistant to attack by the plating solution, such linings consisting of either lead or lead-antimony alloy. Glass linings have been used in place of the metallic lining. They have the advantage of being a non-conductor of current but also the disadvantage of being easily broken. It is possible to use an unlined steel tank which may even be used as an anode but the fact that the steel is slowly affected by the solution, contaminating it with iron, makes such a procedure inadvisable.

Plating baths are composed primarily of chromic acid, the concentration of which may vary from 200 to 450 grams per liter, with the addition of acid radicals, usually sulfates, either in the form of chromic sulfate or of sulfuric acid. The amount of the radicals depends on the particular radicals used, the amount in the case of sulfate radicals being 1% of the chromic acid content of the solution. Various formulas, some including other additions, have been published but all reduce themselves to the fundamental relationship expressed above. The essential criterion of a properly prepared bath for successful commercial chromium plating is the ratio of grams of CrO_3 to grams of SO_4. The optimum ratio of 100 to 1 should be obtained before starting operations and should be maintained for the purpose of continuous operation.

Anodes generally used are lead, the surface area of the anodes being calculated to be somewhat larger than the surface area of the articles to be plated.

The plating is usually carried on by passing a current with a density of between 150 and 200 amperes per square foot from the anode to the cathode with the temperature of the plating bath maintained between 40° and 45°C. (optimum), but it is possible to deposit chromium plate at a temperature between 15° and 45°C. The character of the deposit is materially affected by variations of temperature and due to the fact that the passage of electric current through the solution tends to raise the temperature thereof, facilities should be available for cooling or, in some instances, heating this solution. This is usually accomplished by the insertion of lead coils along the walls of the tank below the solution level, these coils being so connected that either steam or cold water may be passed through them automatically. Temperature control devices facilitate the regulation of the solution temperature. More detailed information for chromium plating may be found in the pamphlet on commercial chromium plating published by the Department of Engineering Research of the University of Michigan, Circular Series 3, dated January 1930.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Chromium may be deposited on practically all commercial metals but the methods of deposit vary somewhat. Chromium plate in itself is not a good rust-resistant coating and for this reason is not deposited on steel directly if the purpose is to prevent corrosion. Under such conditions the steel or iron is first plated with a coating of copper and then a coating of nickel. In some cases a preliminary coating of nickel, copper and nickel is applied. These preliminary coatings of nickel and copper should be carefully applied and should be not less than 0.005″ in thickness. This is a minimum figure which should be exceeded if possible. Over these preliminary coatings of copper and nickel, a thin film of chromium is applied, the time of plating usually being from two to five minutes with a current density of about 150 amperes per square foot. A coating of chromium so applied will serve to prevent any tarnishing or oxidation of the underlying coating of nickel and the composite coating serves as a very excellent rust resistant. Such a coating of chromium however is not highly resistant to abrasion or scratching because of the soft coatings of copper and nickel underneath the chromium and the comparative softness of the underlying steel.

Chromium may be deposited directly on steel where wear resistance is the desired result but steel so plated is not corrosion resistant. Where steel is plated for wear resistance, the hardness of the base metal is of primary importance and will determine the degree of wear resistance of the plated article. The hard coating of deposited chromium will increase the resistance of the plated article to surface abrasion and scratching but a thin coating of chromium is not sufficiently strong to resist deformation by reason of severe stress or pressure which is transmitted to the base metal. The thickness of chromium to be deposited for wear resisting purposes may vary from a fraction of a thousandth of an inch to several thousandths depending on the purpose for which it is to be used.

When nickel is applied as a preliminary coating before chromium plating, improper cleaning or improper deposition of the nickel will cause it to be peeled from the work in the subsequent plating operation. Although chromium plating is easy to control all operations must be carried out carefully and in a technically correct manner.

Chromium plating is used for three classes of service: (1) For decorative purposes: (2) For resistance to wear and abrasion. (3) For resistance to corrosion.

The development of commercial chromium plating has been extremely rapid within the last five years. All phases of the plating process and its adaptation have been made the subject matter of various patents which have been issued by the United States Patent Office. This patent situation is somewhat involved but will probably be clarified when decisions are rendered in the suits which are now pending † in the Federal Courts. Those considering the operation of chromium plating units will probably find it desirable to investigate the patent situation before taking any decisive step.

† January 1930.

Chromium-potassium Sulfate (Chrome alum) $K_2SO_4.Cr_2(SO_4)_3.24H_2O$.
Color and properties: Dark, violet-red crystals.
Constants: Sp.gr. 1.81278.
Soluble in water.
Derivation: By reducing potassium bichromate in dilute sulfuric acid with sulfurous acid.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 432-520 lb. barrels; 500 lb. casks.
Uses: Tanning industry (chrome-tan liquors); textile industry (mordant); photography (fixing bath); ceramics.
Railroad shipping regulations: None.*

Chromium Sesquichloride. See Chromic chloride.

Chromium Sulfate. See Chromic sulfate.

Chromium Trioxide. See Chromic acid.

Chromoform $(C_6H_{12}N_4)(CH_3)_2Cr_2O_7$.
Hexamethylenetetramine methyl dichromate used in medicine as a urinary antiseptic (unofficial).
Railroad shipping regulations: None.*

Chromous Acetate (Chromium acetate) $Cr(C_2H_3O_2)_3.H_2O$.
Color and properties: Grayish-green powder or bluish-green, pasty mass.
Soluble in water; insoluble in alcohol.
Derivation: By the action of acetic acid on chromium hydroxide. The solution is evaporated and crystallized.
Method of purification: Recrystallization.
Grades: Technical; paste; powder; C.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Textile mordant; tanning.
Railroad shipping regulations: None.*

Chrysamine. A coal-tar dyestuff used in dyeing textiles and leather yellow.

Chrysarobin (Medicinal "chrysophanic acid"; Purified goa powder; Araroba; Dioxymethylanthraquinone) $C_{30}H_{26}O_7$.
Color and properties: Microcrystalline orange-yellow powder; turns brownish-yellow on exposure to air; very irritating to the eyes.
Derivation: Neutral principle from goa powder, a substance deposited in the wood of Vouacapoua araroba; yielding chrysophanic acid on oxidation.
Constants: Sp.gr. 0.920 to 0.922; m.p. 157°C.
Soluble in chloroform, benzene; slightly soluble in carbon bisulfide, ether and alcohol; very slightly soluble in water.
Grades: Technical; U.S.P.
Containers: 1 oz. vials; ¼, 1 lb. cartons; 5, 10, 50 lb. cans.
Uses: Medicine (skin diseases).
Railroad shipping regulations: None.*

Chrysazine. See 1:8-Dihydroxyanthraquinone.

Chrysoberyl $BeAl_2O_4$ or $BeO.Al_2O_3$.
A natural glucinum aluminate containing 19.8% glucina. Color, various shades of green (asparagus, grass, emerald, yellow), yellow or sometimes raspberry or columbine red. Vitreous luster. Is not attacked by acids, but is decomposed by fused alkalis. Infusible by blowpipe.
Constants: Sp.gr. 3.65 to 3.75; hardness 8.5.
Occurrence: United States (Connecticut, New York, Maine), Brazil, Ceylon, Moravia, Russia, Ireland.
Uses: Gem stone.

Chrysocale. A jeweler's alloy composed of 9 parts copper, 8 parts zinc, and 2 parts lead.

Chrysocolla $CuSiO_3.2H_2O$.
Bright green to light blue mineral, brown when ferriferous. White to pale blue streak, vitreous, dull luster. Contains 45.2% CuO, 34.3% SiO_2, 20.5% H_2O, with silica, alumina, copper carbonate, or phosphate, limonite as impurities. A secondary mineral found as vitreous translucent incrustations, or dull earthy masses. Soluble in KOH.
Constants: Sp.gr. 2 to 2.3; hardness 2 to 4.
Occurrence: United States (Arizona, Wyoming, Nevada, New Jersey, Pennsylvania, Utah,

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Idaho), England, Hungary, Siberia, Germany, Chile.
Uses: Source of copper.

Chrysoidine. An orange dye for wool, silk, cotton and leather; also used in coloring confectionery and liqueurs.

Chrysolite. See Olivine.

Chrysophanic Acid. See Chrysarobin.

Chrysophenine. A yellow synthetic dye, used in dyeing textiles and leather.

Chryoprase. A variety of chalcedony (q.v.). Color, apple green.

Chrysotile. See Asbestos.

Cicuta (Water hemlock; Cowbane). A perennial European plant of which most species are poisonous, Cicuta maculata is the American variety, which is poisonous. Contains an alkaloid resembling coniïne, hence cicuta and conium are sometimes confused.

Cumicifuga (Black snake root; Actaea; Black cohosh; Bugbane; Bugwort).
Dried rhizome and roots of Cimicifuga racemosa.
Habitat: United States and Canada.
Grades: Technical; U.S.P.
Containers: Bales.
Uses: Medicine (heart depressant).
Railroad shipping regulations: None.*

Cimicifugin (Macrotin). A mixture of resins and other bodies occurring in Cimifuga, obtained by pouring a concentrated tincture of the drug into a large volume of water. Used in medicine (unofficial) similar to cimicifuga.

Cina. See Santonica.

Cincholepidine. See Lepidine.

Cinchona Bark, Calisaya (Peruvian bark; Calisaya bark; Yellow cinchona bark; Yellow calisaya bark; Jesuits' bark).
Derivation: Dried bark of Cinchona calisaya or other species of cinchona.
Habitat: South America; cultivated in Java, India, Jamaica, Ceylon and West Africa.
Grades: Technical; U.S.P.
Containers: Bales.
Uses: Medicine.
Railroad shipping regulations: None.*

Cinchona Bark, Loxa (Loxa bark; Cinchona pallida; Crown bark; Pale cinchona; Loja bark; Huanuco bark; Cuenca bark).
Derivation: Bark of Cinchona officinalis and other species of cinchona.
Habitat: Loxa and other parts of Ecuador; cultivated in India.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Cinchona Bark, Succirubra (Red cinchona; Red Peruvian bark; Red bark; St. Ann's bark).
Derivation: Dried bark of Cinchona succirubra or of its hybrids.
Habitat: South America; cultivated in Japan, Java, India and Western Africa.
Grades: Technical; U.S.P.
Containers: Bales.
Uses: Medicine.
Railroad shipping regulations: None.*

Cinchonidine.
(a) Alkaloid: $C_{19}H_{22}N_2O$.
(b) Hydrochloride: $C_{19}H_{22}N_2O.HCl.H_2O$.
(c) Bisulfate: $C_{19}H_{22}N_2O.H_2SO_4.5H_2O$.
(d) Sulfate: $(C_{19}H_{22}N_2O)_2.H_2SO_4.3H_2O$.
Color and properties: White prisms or powder.
Constants: M.p. (a) 207.2°C.; (d) 205.3°C.
(a) Soluble in alcohol; slightly soluble in water and ether. (b) Soluble in alcohol; slightly soluble in water. (c) Soluble in water and alcohol. (d) Soluble in water and alcohol; slightly soluble in ether.
Derivation: By extraction of certain varieties of cinchona bark, and subsequent crystallization. The salts are formed by the action of the respective acid on the alkaloid.
Method of purification: Recrystallization.
Grades: Technical; U.S.P. (sulfate).
Containers: ⅛, ¼, ½, 1 oz. vials; 5, 25, 50, 100 oz. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Cinchonine.
(a) Alkaloid: $C_{19}H_{22}N_2O$.
(b) Hydrochloride: $C_{19}H_{22}N_2O.HCl.2H_2O$.
(c) Nitrate: $C_{19}H_{22}N_2O.HNO_3.\frac{1}{2}H_2O$.
(d) Bisulfate: $C_{19}H_{22}N_2O.H_2SO_4.4H_2O$.
(e) Sulfate: $(C_{19}H_{22}N_2O)_2.H_2SO_4.2H_2O$.
Color and properties: White, shining prisms or needles.
Constants: M.p. (a) 264.3°C.; (e) 198.5.
(a) Slightly soluble in water, alcohol and ether. (b) Soluble in water, alcohol and ether. (c) Soluble in water and alcohol. (d) Soluble in alcohol, ether and water. (e) Soluble in water and alcohol; slightly soluble in ether.
Derivation: By extraction of the bark of various species of cinchona and subsequent crystallization. The salts are formed by the action of the respective acid on the alkaloids.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: 1 oz. vials; 5, 25, 100 oz. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Cinchophen. See 2-Phenylquinoline-4-carboxylic acid.

Cinchotine. An alkaloid of cinchona.

Cinder. See Slag.

Cinder Pig.
An inferior variety of pig iron made from cinder and other forms of slag. The slags are usually rich in phosphorus and silicon, resulting in a poor quality metal.

Cinene. See Dipentene.

Cineole. Eee Eucalyptol.

Cinnabar (Natural vermilion; Liver ore) HgS.
Cochineal red, scarlet, reddish brown, blackish mineral, scarlet streak, adamantine luster inclining to metallic when dark-colored and to dull in friable varieties. Is softer and heavier than hematite, cuprite and rutile, has a redder streak than croceite or realgar and is denser than proustite. Contains 86.2% mercury. Soluble in aqua regia. The only common mercury mineral.
Constants: Sp.gr. 8.0 to 8.2; hardness 2 to 2.5.
Occurrence: United States (California, Nevada, Utah, Texas, Arizona), Spain (richest deposits), Rupssia, Servia, Italy, Hungary, China, Japan, Mexico, Chile.
Uses: Most important ore of mercury.

Cinnamaldehyde. See Cinnamic aldehyde.

Cinnameine. See Benzyl cinnamate.

Cinnamene. See Styrene.

Cinnamenol. See Styrene.

Cinnamic Acid (Beta-phenylacrylic acid; Cinnamylic acid) $C_6H_5CHCHCOOH$.
Color and properties: White, crystalline scales.
Constants: Sp.gr. 1.2475; m.p. 133°C.; b.p. 300°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By heating benzaldehyde with sodium acetate in presence of a dehydrating agent (acetic anhydride) or by heating benzyl chloride with sodium acetate in an autoclave. Occurs naturally in Peru and Tolu balsams and styrax.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: 1, 5 lb. glass bottles; 1, 5, 10 lb. cans.
Uses: Medicine; perfumes.
Railroad shipping regulations: None.*

Cinnamic Alcohol (Cinnamyl alcohol; Phenylallic alcohol; Styrylic alcohol; Styryl alcohol; Styrone) $C_6H_5CHCHCH_2OH$.
Color and properties: White needles or crystals; hyacinth-like odor.
Constants: Sp.gr. 1.0397; m.p. 33°C.; b.p. 257°C. Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of styracin and potassium hydroxide and distillation.
Method of purification: Recrystallization.
Grades: Technical.
Containers: 1, 2, 5 lb. bottles; tin cans.
Uses: Perfumery (fixative).
Railroad shipping regulations: None.*

Cinnamic Aldehyde (Cinnamaldehyde; Cinnamyl aldehyde) $C_6H_5CHCHCHO$.
Color and properties: Yellowish oil; cinnamon odor. Keep well stoppered.
Constants: Sp.gr. 1.129; m.p. −8°C.; b.p. 248°C. Soluble in alcohol and ether; very slightly soluble in water.
Derivation: (a) From Ceylon and Chinese cinnamon oils. (b) By condensation of benzaldehyde and acetaldehyde.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 2, 5, 10 lb. bottles.
Uses: Extracts; soap perfume.
Railroad shipping regulations: None.*

Cinnamic Ether. See Ethyl cinnamate.

Cinnamol. See Styrene.

Cinnamon Bark. See Canella.

Cinnamon, Cassia (Cinnamon; Cassia bark; Chinese cinnamon).
Derivation: Bark of Cinnamomum cassia.
Habitat: Southern China and Anam.
Grades: Technical.
Containers: Boxes.
Uses: Medicine; source of cinnamon oil; flavoring; condiment.
Railroad shipping regulations: None.*

Cinnamon, Ceylon.
Derivation: Inner bark of the shoots of Cinnamomum zeylanicum.
Habitat: Ceylon, Sumatra and Borneo; cultivated in tropical Africa, America and Asia.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine; source of cinnamon oil; flavoring; condiment.
Railroad shipping regulations: None.*

Cinnamon-leaf Oil, Ceylon.
Color and properties: Pale yellow, limpid oil; combined cinnamon and cloves odor.
Chief known constituents: Eugenol (65 to 95%), cinnamic aldehyde (up to 25%), safrole and linalool.
Constants: Sp.gr. 1.044 to 1.065 at 15°C.; optical rotation −0° 5′ to 2° 20′ (mostly dextrogyrate); refractive index 1.531 to 1.540.
Solubility in alcohol: In 1 to 3 vols. of 70% alcohol (occasional turbidity on addition of more alcohol).
Derivation: Distilled from the leaves of Cinnamomum zeylanicum, Nees.
Uses: Medicine; flavoring; perfumery.
Railroad shipping regulations: None.*

Cinnamon-Leaf Oil, Seychelles.
Color and properties: Similar to those of cinnamon-leaf oil, Ceylon (q.v.). Phenol content 78 to 94%; aldehyde content (oil containing 78% eugenol) about 5%.
Constants: Sp.gr. 1.0206 to 1.0604 at 15°C.; optical rotation −1° 43′ to +0° 27′.
Solubility in alcohol: In 1 to 1.5 vols. or more of 70% alcohol.
Derivation: Distilled from the leaves of Cinnamomum zeylanicum, Nees.
Uses: Medicine; flavoring; perfumery.
Railroad shipping regulations: None.*

Cinnamon Oil, Ceylon.
Color and properties: A light yellow essential oil; pleasant, delicate cinnamon odor; sweet spicy burning taste. Cinnamic aldehyde content 65 to 76%.
Chief known constituents: Cinnamic aldehyde, eugenol, methyl-n-amyl ketone, furfural, pinene, phellandrene, cymene, benzaldehyde, nonylic aldehyde, hydrocinnamic aldehyde, cuminic aldehyde, linalool, caryophyllene.
Constants: Sp.gr. 1.023 to 1.040 at 15°C.; optical rotation up to −1°; refractive index 1.581 to 1.591.
Solubility in alcohol: In 2 to 3 vols. or more of 70% alcohol.
Derivation: By distillation of the bark of Cinnamomum zeylanicum, Nees.
Adulteration: Cinnamon-leaf oil, cassia oil.
Uses: Medicine; flavoring; perfumery.
Railroad shipping regulations: None.*

Cinnamon Oil, Chinese. See Cassia oil.

Cinnamon Oil, Seychelles.
Color and properties: Similar in color to Ceylon cinnamon oil (q.v.); less agreeable odor. Cinnamic aldehyde content 21.7 to 35%; eugenol content 6 to 15%.
Chief known constituents: Cinnamic aldehyde, eugenol, phellandrene, cymene, camphor, camphene, pinene, limonene, benzaldehyde, linalool.
Constants: Sp.gr. 0.943 to 0.967 at 15°C.; optical rotation −2° 30′ to −5° 10′; refractive index 1.5284 to 1.5327.
Solubility in alcohol: In 0.6 to 5 vols. of 80% alcohol (with opalescence on addition of more alcohol).
Derivation: By distillation of the bark of Cinnamomum zeylanicum, Nees.
Uses: Medicine; flavoring; perfumery.
Railroad shipping regulations: None.*

Cinnamon Oil, Terpeneless.
Concentration: About 1.5 to 2 times that of the ordinary cinnamon oil.
Solubility in alcohol: 60 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Cinnamon-root Oil.
Color and properties: Colorless oil; strong camphor odor. Camphor separates out on standing.
Chief known constituents: Camphor, cinnamic aldehyde, pinene, dipentene, phellandrene, cineole, eugenol, safrole, caryophyllene, borneol.
Constants: Sp.gr. 0.99366 at 15°C.; optical rotation +50.2° (?).
Derivation: Distilled from the roots of Cinnamomum zeylanicum, Nees.
Uses: Medicine; flavoring; perfumery.
Railroad shipping regulations: None.*

Cinnamon, Saigon.
Derivation: Bark of an undetermined species of Cinnamomum.
Habitat: Anam (Cochin China); cultivated in Java, Sumatra and South America.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine; source of cinnamon oil; flavoring; condiment.
Railroad shipping regulations: None.*

Cinnamon Wood. See Sassafras bark.

Cinnamyl Alcohol. See Cinnamic alcohol.

Cinnamyl Aldehyde. See Cinnamic aldehyde.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Cinnamyl Cinnamate (Styracin)
$C_9H_7O_2C_9H_9$.
Color and properties: Rectangular prismic crystals.
Soluble in alcohol, ether, benzene.
Derivation: Extraction from storax.
Uses: Perfumery.

Cinnamylic Acid. See Cinnamic acid.

Cinnamylic Ether. See Ethyl cinnamate.

Ciose. A dry, soluble protein product derived from beef and representing 83 to 85% protein.

Cirtine (False topaz). A form of native silica or quartz (q.v.). The "Occidental topaz" or "Spanish topaz" of jewelers. See also Topaz.

Citramine. See Hexamethylenetetramine methylene citrate.

Citric Acid (Oxytricarballylic acid)
$C_3H_4(OH)(COOH)_3.H_2O$.
Color and properties: Colorless, odorless crystals or white powder.
Constants: Sp.gr. 1.542; m.p. 153°C.
Soluble in water, alcohol and ether.
Derivation: From lemon or lime juice by neutralizing with calcium carbonate and decomposition of calcium citrate, thus formed, by mineral acid.
Method of purification: Recrystallization.
Impurities: Tartaric acid.
Grades: Technical; U.S.P.; C.P.
Containers: Crystals and powder: 1 oz., ¼, 1 lb. bottles; ¼, 1 lb. cartons; 5, 25, 50 lb. boxes; 112 lb. kegs. Powder: 200 lb. barrels. Crystals: 230 lb. barrels. C.P.: 1 oz., ¼, 1 lb. bottles.
Uses: Citrates; medicine (mild astringent, sunburn); flavoring extracts; confectionery; soft drinks; effervescing salts.
Railroad shipping regulations: None.*

Citron Oil (Cédrat oil).
An essential oil obtained from the rind of the citron, Citrus medica, var. vulgaris, Risso and Citrus medica, var. gibocarpa, Risso. Citral content: 5 to 7%.
Chief known constituents: Citral, limonene, dipentene, and a crystalline body which melts at 144° to 145°C.
Constants: Sp.gr. 0.850 to 0.870; optical rotation +65° to +80°; refractive index about 1.475.
Railroad shipping regulations: None.*

Citron Yellow. See Chrome yellows.

Citronella Oil (Lana batu; Verbena oil).
Color and properties: A limpid, yellowish or greenish-yellow liquid; agreeable odor.
Chief known constituents: Geraniol, citronellal and methyl eugenol.
Constants: Refractive index 1.4811 to 1.4830; optical rotation −5 to −21.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the grass of a species of Andropogon, found in Ceylon, India, the Malakkan Peninsula and tropical East Africa.
Method of purification: Rectification.
Grades: Lana batu from Ceylon; Mahapargiri from Java.
Containers: Tins; glass bottles.
Uses: Perfumes; medicine; insectifuge; source of citronellal, geraniol; toilet soaps.
Railroad shipping regulations: None.*

Citronella Oil, Singapore.
Color and properties: A colorless oil; agreeable verbena-like odor.
Chief known constituents: Geraniol and citronellal.
Constants: Sp.gr. 0.886 to 0.900; optical rotation −0° 34′ to −3°; refractive index 1.465 to 1.468.
Soluble in alcohol, ether, and chloroform.
Derivation: Distilled from the fruit of Tetranthera citrata.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: See Citronella oil.
Railroad shipping regulations: None.*

Citronella Oil, Terpeneless.
Concentration: About 2 times that of the ordinary citronella oil.
Constants: Sp.gr. 0.91 to 0.92.
Solubility in alcohol: 2 parts per 100 of 70% alcohol; 150 parts per 100 of 80% alcohol.
Railroad shipping regulations: None.*

Citronellal Hydrate. See Hydroxycitronellal.

Citrophen (Phenetidine citrate, para-).
Color and properties: White crystalline powder.
Constants: M.p. 188°C.
Slightly soluble in water.
Derivation: A compound of citric acid and paraphenetidine.
Uses: Medicine (antipyretic, in migraine, antineuralgic, unofficial).
Railroad shipping regulations: None.*

Citrullin. See Colocynthin.

Citrullus colocynthis. See Colocynth.

Citrus aurantium. See Orange peel, sweet.

Citrus vulgaris. See Orange peel, bitter.

Civet (Zibeth).
Derivation: Unctuous secretion from the civet cat, Viverra civetta, Zibetha.
Habitat: Asia, Malakka Islands and East Indies.
Soluble in hot alcohol and ether; insoluble in water.
Grades: Technical (crude, refined, artificial).
Containers: Horns of variable size ranging from 20 to 40 ozs. each; 1, 2, 4, 8 oz. jars.
Uses: Perfumery (fixative).
Railroad shipping regulations: None.*

Clarite. See Enargite.

Clausthalite.
PbSe. Often contains silver or cobalt. Bluish lead-gray mineral, with grayish-black streak, of metallic luster. Contains 72.4% lead, 27.6% selenium.
Constants: Sp.gr. 7.6 to 8.8; hardness 2.5 to 3.

Clays. Natural substances which, when finely ground and mixed with water, form pasty moldable masses that preserve their shape when air dried; the particles soften and coalesce upon being highly heated and form a stony mass upon cooling. Clays vary greatly mineralogically and chemically and consequently in their physical properties. Most of them contain many impurities, but their base is hydrous aluminum silicate. For specific clays, see the following:

Albany Slip.
A clay found near Albany, N. Y. Its color, when burned, is a deep, seal brown.

Typical analysis:	%
Silica	57.65
Alumina	15.75
Iron oxide	4.92
Calcium oxide	6.28
Magnesium oxide	3.20
Potassium oxide	3.10
Sodium oxide	1.80
Ignition loss	7.30

Temperature range: Cones 6 to 9 (sometimes higher).
Uses: Glaze on stoneware and electrical porcelain; sealing kiln-door wickets.

Ball Clay.
Certain white-burning clays consisting chiefly of aluminum silicate. They are usually very plastic, tough and fine-grained and the color

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

of the raw material may range from white through pink, gray, blue and tan to black.

The best clays are blue in color. They exhibit great plasticity; freedom from impurities; extreme fineness of particles; and, when burned, freedom from color and moderate refractoriness and strength. The lower grades are not sufficiently pure for use in whiteware and are largely used in the manufacture of stoneware.

Black clays are white-burning plastic clays of tertiary origin, very closely allied to blue clays but stained black by contained carbonaceous matter. They often contain lumps of lignite. Some of these clays contain more than 10% carbon and are difficult to burn. They differ from other ball clays in having a distinct odor.

Ball clay may be defined by the practical potter as a more or less white to cream-burning highly plastic clay which vitrifies usually at a temperature equal to that of about cone 8 to 10, but is frequently found to fuse at as high a temperature as cone 34. The fusion points range all the way from cone 18 to 34, although practically all high grade ball clays have fusion points above cone 30.

Typical analyses:

	Tennessee (a)	Kentucky (b)	English Devonian
		Per Cent.	
Silica	46.85	46.87	48.99
Alumina	33.15	36.58	32.11
Ferric oxide	2.04	1.14	....
Ferrous oxide	....	....	2.34
Titanic oxide	....	0.43	....
Lime	0.33	0.50	0.43
Magnesia	0.40	tr.	0.22
Potash	0.61	tr.	3.31
Soda	0.10	1.60	
Sulfur trioxide	0.03	0.06	
Loss on ignition	16.45	11.52	9.63
Moisture at 100°C.	....	1.60	....
	99.96	100.30	97.03

(a) Whitlock, Tenn. No. 3.
(b) Mayfield, Old Mine.

Occurrence: United States (Kentucky, Tennessee, Mississippi, New Jersey, Florida), England.

Uses: Bonding and plasticizing agent in terra cotta, stoneware, refractories, whiteware, glass house refractories. Flotation agent for glassy frit in vitreous porcelain enamels.

Bond Clay. Highly plastic clays (e.g., ball clays, bentonite, plastic fire-clays) used to give molding and bonding properties to materials.

Brown Ironstone Clay. See Limonite.

China Clay. See Kaolin.

Colloidal Clay. See Bentonite.

Common Brick Clay. These clays vary widely in composition but usually a low-grade, red-burning clay containing a high percentage of fluxing impurities is used. The principal requirements are that they shall mold readily and burn hard at as low a temperature as possible with a minimum loss from cracking or warping. See also Face brick, clay; and Pressed brick, clay.

Cornish Clay.

A China clay (q.v.) obtained from Cornwall, England.

Egyptianized Clay.

A clay to which tannin has been added in order to make it more plastic.

Enamel Brick Clay.

Similar to clays used for manufacture of buff face brick. See Face brick clay.

Enamel Clay. Fat clays which are capable of floating non-plastic enamel slips so that they will spray and dip more evenly. Enamel clays usually contain some alkali and must be as low as possible in carbon.

Face Brick Clay. The most widely used are red-burning clays, but white-burning clays and buff-burning clays, either semi-refractory or refractory, are also much used. The physical requirements are much the same as those of pressed brick clay (q.v.).

Fat Clay. See Ball clay.

Fire-clay.

Clays containing only small amounts of fluxing impurities, but high in silica, alumina and water, and, therefore, capable of withstanding high temperatures. They are usually light in color, ranging from gray to yellowish-red and exhibit wide variation in both chemical and physical properties. Some authorities believe no clay should be classed as a fire-clay unless its fusion point exceeds that of cone 27 (1,607°C.).

They are usually grouped either as plastic or flint. There are, however, some having properties which may be considered as intermediate and these are usually referred to as either semi-plastic or semi-flint.

The plastic clays are usually distinguished by a lower ratio of alumina to silica than the flint clays and also contain a higher percentage of impurities, together with a lower fusion point. They break down readily on exposure to weather and quickly develop good bonding power. The flint clays are hard and are better able to resist weathering. Plasticity can only be developed in them either by considerable grinding and tempering or by prolonged weathering. They are highly refractory. Semi-plastic and semi-flint clays often possess a high degree of refractoriness sometimes approaching that of the flint clays.

Analysis range:

	Flint	Semi-flint and Semi-plastic	Plastic
		Per Cent	
Ignition	7.90-13.78	11.53-14.16	5.60-12.68
Silica	41.00-50.27	43.46-51.04	44.60-76.24
Alumina	37.22-39.72	32.31-37.45	15.76-37.37
Iron oxide	1.14- 5.78	0.72- 1.65	0.52- 4.79
Titania	1.51- 2.22	0.96- 2.80	1.52- 2.16
Lime	0.13- 0.44	0.18- 0.39	0.08- 0.44
Magnesia	0.01- 1.01	0.24- 0.64	0.14- 1.01
Alkalis	0.20- 1.57	0.12- 1.72	0.10- 1.80
Fusion, cone	32-35	32-33	20-33

Occurrence: United States (Missouri, Pennsylvania, Maryland, Ohio, Kentucky, New Jersey, Colorado).

Uses: Fire-brick, retorts, furnace linings, crucibles, terra cotta, glass factory pots and tanks.

Fireproofing Brick Clay.

Similar varieties to those described under Hollow brick clay are commonly used.

Gumbo Clay. A series of fine-grained, plastic and tough clays which are chiefly used in the manufacture of railroad ballast. They cannot be used for brick making due to their high shrinkage on burning.

Occurrence: West Central States of the United States.

Hollow Brick Clay.

A variety of clays is used for this purpose, the determining factor mostly being the locality of manufacture. On the whole, the following properties are desirable: Fair tensile strength, sufficient plasticity to flow smoothly through the die, together with ability to burn to a hard, though not vitrified, body at a comparatively low cone. Red-burning surface clays of Pleistocene age are often used where red brick are also made. Carboniferous shales are commonly used in coal-measure areas such as

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

in Pennsylvania, Illinois, Indiana, and Ohio, while a red-burning sandy clay mixed with a small amount of low-grade fire-clay is used in New Jersey.

Ironstone Clay. See Hematite, red.

Ironstone Clay, Brown. See Hematite, red.

Japanese Acid Clay. An amorphous mixture of hydrated aluminum silicate and silica.

Michigan Slip Clay.

A clay found in Ontonagon County, Mich. It is similar to Albany slip clay (q.v.). Typical analysis:

	Per Cent
Silica	62.21
Alumina	10.24
Iron oxide	6.58
Calcium oxide	8.24
Magnesium oxide	0.30
Potassium oxide	4.20
Sodium oxide	1.00
Ignition loss	7.23

Uses: Similar to Albany slip clay (q.v.).

Paint Clay.

Ferruginous or manganiferous clay which mixes well with linseed oil. The color range is from light yellow to dark reddish-brown. See also Ochers.

Paper Clay. One suitable for mixing with paper pulp in order to give body, weight and finish to some grades of paper. Whiteness of color, plasticity, and freedom from sand are essential characteristics of these clays.

Paving Brick Clay. Usually impure shales and fire-clays are used for this purpose. Desirable qualities in a paving brick clay are a fair degree of plasticity, good tensile strength, and a range of not less than 250°F. between the points of incipient vitrification and viscosity.

Occurrence: United States (Ohio, Pennsylvania, Indiana, Illinois, New York, Maryland, Colorado).

Pipe Clay. Usually of a ball clay nature but the term is rather wide in its application and may embrace almost any fine-grained, plastic clay.

Porcelain Clay. See Kaolin.

Potters Clay. See Ball clay.

Pressed Brick Clay.

A better-grade clay than is ordinarily used for common brick. The principal requirements are absence of soluble salts, uniformity of color and freedom from warping and cracking in burning, together with sufficient hardness and low absorption when burned at a moderate temperature. See also Common brick clay and Face brick clay.

Refractory Clay. See Fire clay.

Retort Clay. Plastic, dense-burning, semi-refractory clays which find application in the manufacture of gas retorts and zinc retorts. The term is often used synonymously with stoneware clay in New Jersey.

Sagger Clay. Clays used in the making of saggers where high-grade pottery is burned. These clays may be of two types: (a) Open-burning and (b) semi-open or tight-burning.

Occurrence: United States (Tennessee, Kentucky, New Jersey, Pennsylvania, Missouri, California).

Sewer Pipe Clay. These clays are similar in characteristics to those used for paving brick. They must contain enough silica and stand sufficient heat to combine with the salt fumes to produce the required glaze. A high percentage of iron is also necessary since it aids in the formation of the salt glaze. A high percentage of soluble salts is undesirable.

Slip Clay. A clay containing a large amount of fluxing material, which melts at a low temperature, forming a natural, greenish or brown glaze. Being a natural clay it will undergo the same changes in burning as the body on which it is placed. A good slip clay must be fine-grained, free from lumps, show a low air-shrinkage and mature in burning as little above cone 5 as possible. Artificial mixtures of exactly similar composition to the natural clays do not give results comparable with those of the natural product as to gloss or color. Albany slip clay (q.v.) is perhaps the best known and most widely used.

Stoneware Clay.

Although an inferior material may sometimes be used, these clays usually range from semi-refractory up to the refractoriness of fire-brick. In the latter case they differ from fire-brick in burning to a very dense body at a low temperature. Desirable characteristics of a good stoneware clay are: (a) Tensile strength of 125 lbs. per sq. in. or over; (b) low fire-shrinkage; (c) sufficient plasticity and toughness to permit its being turned on the potter's wheel; (d) absence of concretionary minerals such as lime or iron; (e) low coarse sand content.

Average of ten analyses of stoneware clays used in Ohio potteries:

	Per Cent
Clay base	56.65
Sandy matter	37.45
Fluxing matter	4.44
Moisture	1.57
Total	100.11
Total silica	**65.09**

Occurrence: United States (Ohio, New York, New Jersey, Missouri, Texas, Minnesota, Illinois, Indiana).

Uses: Stoneware; yellow ware; art ware; earthenware; terra cotta.

Terra-Cotta Clay.

Terra-cotta clays differ quite widely, but semi-fire-clays or a mixture of these with a more impure clay or shale are mostly used. Buff-burning clays are preferred because of the hard body produced on burning. Desirable qualities in the terra-cotta clay: (a) Dense burning character and bonding power. (b) Low shrinkage and freedom from warping. (c) Absence of soluble salts.

Properties of one clay used in one New Jersey factory:

Air shrinkage	4½%
Tensile strength	97½ lbs./sq. in.
Fire shrinkage:	
At cone 01	1.5%
At cone 5	4.8%
At cone 10	5%
Hardness:	
At cone 01	not steel hard
At cone 5	nearly steel hard
Absorption:	
At cone 01	very absorbent
At cone 5	slightly absorbent
At cone 10	nearly impervious
Color:	
At cone 01	pale buff
At cone 5	gray buff
At cone 10	gray buff

Occurrence: United States (New Jersey, Pennsylvania, Indiana, Missouri).

Wad Clay A low-grade fire-clay used in grouting the joints between saggers when they are set up in bungs in the kilns.

Ware Clay. A term sometimes used synonymously with ball clay, particularly in New Jersey.

White Clay. See Kaolin.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Clayite. A name suggested for the amorphous clay base of the composition $Al_2O_3.2SiO_2.2H_2O$. See also Kaolinite.

Cleveite. A crystallized variety of uraninite (q.v.). It contains about 10% of the yttrium earths. It is particularly rich in the gas helium. Sp.gr. 7.49.

Cleve's Acid. See 1-Naphthol-5-sulfonic acid and 1-Naphthylamine-6 and 7-sulfonic acid.

Cliffstone Paris White. See Whiting.

Climbing Ivy. See Rhus toxicodendron.

Clinochlore. A complex silicate mineral corresponding to the formula $H_8(MgFe)_5Al_2Si_3O_{18}$, sometimes with replacement of Mg by Mn and Al by Cr. Color, various shades of green grading to white or yellowish, sometimes red. White or greenish-white streak, pearly luster.
Constants: Sp.gr. 2.65 to 2.78; hardness 2 to 2.5.
Occurrence: United States (Pennsylvania, New York, Vermont), Russia, Italy, Austria, Switzerland, Germany, Sweden.

Clintonite. See Seybertite.

Clotbur. See Lappa.

Cloth Oil. A term applied to an oil of sp.gr. 0.875 obtained by distilling the residue of Russian petroleum.

Clove. See Caryophyllus.

Clove Oil (Caryophil oil).
Color and properties: A pale yellow, thin liquid; darkens and thickens with age and exposure; strong aromatic odor; pungent and spicy taste.
Chief known constituent: Eugenol.
Constants: Sp.gr. 1.048 to 1.070; b.p. 250° to 260°C.; refractive index 1.5301 to 1.5360; optical rotation to—1° 10′.
Soluble in ether and chloroform; soluble in 1 to 2 vols. and more of 70% alcohol; fresh, so-called extra-light oils in 2.5 to 3 vols. of 60% alcohol.
Derivation: Distilled from cloves, the unexpanded flowers of Eugenia aromatica.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 6 lb. bottles; 25, 60 lb. tins.
Uses: Medicine (local irritant, anesthetic); flavoring; dentistry; perfumery; confectionery; soaps.
Railroad shipping regulations: None.*

Clove Oil, Light. See Caryophyllene.

Clove Oil, Terpeneless.
Concentration: About 1.5 times that of the ordinary clove oil.
Constants: Sp.gr. about 1.07; optical rotation nil.
Solubility in alcohol: 50 vols. in 100 vols. of 60% alcohol; 100 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Clove-stems Oil.
Color and properties: Similar to clove oil; less agreeable odor.
Chief known constituents: Contains more eugenol than clove oil.
Constants: Sp.gr. 1.040 to 1.067 at 15°C.; optical rotation up to —1° 30′; refractive index 1.531 to 1.538.
Solubility in alcohol: In 1 to 2 vols. and more of 70% alcohol; in 2.5 to 3 vols. of 60% alcohol.
Derivation: By distilling the stems of cloves.
Uses: Wherever a product of inferior odor to that of clove oil is admissible.
Railroad shipping regulations: None.*

Club-moss. See Lycopodium.

Clutterbuck's Elaterium. See Elaterium.

Coal.
Coal is usually loosely classified as follows:

	Per Cent Volatile
Anthracite	3 to 10
Semi-bituminous	12 to 20
Lignite	25 to 38
Bituminous	25 to 50

Bituminous coals are also loosely divided into coking (production of coke) and furnace (suitable for blast-furnace use) coals. For more complete data see Peat, Lignite, Bituminous coal, Semi-bituminous coal, Cannel coal, Anthracite. See also Blind coal, Parrot coal, Jet coal, Pitch coal, Specular coal, Block coal, Boghead coal, Bony coal, Cherry coal, Coal balls, Coal stone.

Coal Balls. Spheroidal and nodular masses of calcite or pyrite found in coal beds.

Coal Brass. A term sometimes applied in the coal-mining industry to iron pyrites when found in conjunction with coal.

Coal Gas (Bench gas).
A mixture of gases produced by the destructive distillation of bituminous coal in highly heated fire-clay or silica retorts. A typical gas will analyze 49.8% hydrogen, 29.5% methane, 4.0% illuminants, 8.5% carbon monoxide, 3.2% ethane, 1.6% carbon dioxide, 0.4% oxygen, 3.2% nitrogen.
Constants: Candle power 16.1; B.t.u. 622.
Uses: Domestic and industrial heating and lighting.

Coal, Glance. See Carbon, gas.

Coal Naphtha. See Benzene.

Coal Oil. Crude petroleum, kerosene or the crude oil from the destructive distillation of bituminous coal.

Coal, Paper. See Dysodil.

Coal, Soft. See Bituminous coal.

Coal Specials. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
2-W	C	4
3-C	C	4

Railroad shipping regulations: High explosive.

Coal Stone. A variety of cannel coal (q.v.).

Coal-tar.
Derivation: A black, viscous liquid, obtained in the destructive distillation of coal.
Soluble in ether, benzene, carbon bisulfide, chloroform; partially soluble in alcohol, acetone, methanol and benzine.
Grades: Crude; refined; N.F.
Containers: Tank-cars; barrels.
Uses: Waterproofing, paints, pipe-coating, roads, roofing, insulation, production of benzene, toluene, xylene, phenol, anthracene, lampblack and pitch, by distillation; medicine (to combat inflammation).

Coal-tar, Colorless. See Anthrasol.

Coal-tar Naphtha. See Naphtha, solvent.

Coal-tar Pitch.
Color and properties: A dark brown to black, amorphous body, varying in consistency from soft and sticky to hard and brittle, according to the degree to which distillation has been carried out.
Derivation: Coal-tar pitch is the residue remaining after coal-tar has been distilled to recover the light, medium and heavy oils, or refined coal-tar.
Grades: Technical.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: 200, 300, 500 lb. barrels.
Uses: Waterproofing; roofing; paving compounds and fillers; insulation; fuel briquetting; paints, core-compounds; electrodes; pitch-coke; fuel.
Railroad shipping regulations: None.*

Coalite. A smokeless coal obtained by low-temperature distillation of coal.

Coalites. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
A, L.F.	A	I a
B, L.F.	B	I a
C, L.F.	A	I a
D, L.F.	A	I a
E, L.F.	A	I a
F, L.F.	B	I a
G, L.F.	A	I a
H, L.F.	A	I a
I, L.F.	A	I a
M, L.F.	B	I a
S, L.F.	B	I a
T, L.F.	A	I a
Y,	B	I a
4, L.F.	B	4

Railroad shipping regulations: High explosive.

Cobalt Co.
Color and properties: Steel-gray, shining, hard, ductile, somewhat malleable metal.
Constants: Sp.gr. 8.76; m.p. 1,467°C.
Occurrence: Not found native. Principal ores are sulfides, oxides, silicates, with nickel or iron (smaltite, cobaltite, chloanthite, linnaeite, niccolite, garnierite, pentlandite). Principal sources of ores: Canada, Belgium.
Derivation: From ores by roasting followed by reduction.
Forms available: Rondels (1" x ¾"); shot; anodes.
Containers: Bags; casks.
Uses: Chemical (cobalt salts, catalyst, oxidizing agent); alloys; electroplating; ceramics; lamp filaments; catalyst in hydrogenation of oils; coloring glass; inks; paints and varnishes; colored signs.
Railroad shipping regulations: None.*

Cobalt Acetate. See Cobaltous acetate.

Cobalt-ammonium Sulfate $CoSO_4(NH_4)_2SO_4 \cdot 6H_2O$.
Color and properties: Ruby-red crystals.
Constants: Sp.gr. 1.902.
Soluble in water; insoluble in alcohol.
Derivation: By the action of dilute sulfuric acid of ammonio-cobaltous hydroxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Tins; glass bottles.
Uses: Ceramics.
Railroad shipping regulations: None.*

Cobalt Arsenate. See Cobaltic arsenate.

Cobalt Bloom. See Erythrite.

Cobalt Blue (Thénard's blue; Cobalt ultramarine; King's blue; Leyden blue).
A pigment composed of a mixture of cobalt and aluminum oxides. Obtained by heating a mixture of 1 part cobalt phosphate and 8 parts aluminum hydroxide. It is the most durable of all blue pigments, being completely unaltered by the atmosphere and only slightly subject to the action of chemical reagents.

Cobalt Bromide. See Cobaltous bromide.

Cobalt Carbonate. See Cobaltous carbonate.

Cobalt Chloride. See Cobaltic chloride and Cobaltous chloride.

Cobalt Glance. See Cobaltite.

Cobalt Green. See Cobalt zincate.

Cobalt Hydrate. See Cobaltic hydroxide and Cobaltous hydroxide.

Cobalt Hydroxide. See Cobaltic hydroxide and Cobaltous hydroxide.

Cobalt Iodide. See Cobaltous iodide.

Cobalt Japan Drier. A paint or varnish drier made by heating cobalt oxide with oil or rosin or by decomposing soaps with a soluble salt of cobalt.

Cobalt Linoleate. See Cobaltous linoleate.

Cobalt Nitrate. See Cobaltous nitrate.

Cobalt Oleate. See Cobaltous oleate.

Cobalt Oxide. See Cobaltic oxide and Cobaltous oxide.

Cobalt Peroxide. See Cobaltic oxide.

Cobalt Phosphate. See Cobaltous phosphate.

Cobalt-potassium Nitrite (Cobalt yellow; Potassium cobaltinitrite) $2CoK_3(NO_2)_6 \cdot 3H_2O$.
Color and properties: Yellow, microcrystalline powder.
Constants: M.p.: Decomposes at 200°C.
Slightly soluble in water; insoluble in alcohol.
Derivation: By adding potassium nitrite and acetic acid to a solution of a cobalt salt.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; yellow pigment; painting on glass or porcelain.
Railroad shipping regulations: None.*

Cobalt Pyrites. See Linnaeite.

Cobalt Resinate. See Cobaltous resinate.

Cobalt Sulfate. See Cobaltous sufate.

Cobalt Tungstate. See Cobaltous tungstate.

Cobalt Ultramarine. See Cobalt blue.

Cobalt Wolframate. See Cobaltous tungstate.

Cobalt Yellow. See Cobalt-potassium nitrite.

Cobalt Zincate (Rinmann's green; Cobalt green).
Color and properties: Bright green powder.
Soluble in acids; insoluble in water.
Derivation: (a) By roasting a paste made of zinc oxide and a solution of pure cobalt nitrate or sulfate in a muffle furnace. (b) By adding a solution of a zinc salt to one of a cobalt salt, using a carbonate, phosphate or an arsenate of sodium as a precipitating agent, drying and heating.
Grades: Technical.
Containers: Wooden barrels.
Uses: Paint pigments.
Railroad shipping regulations: None.*

Cobaltic Arsenate (Cobalt arsenate) $Co_3(AsO_4)_2 \cdot 8H_2O$.
Color and properties: Violet-red powder.
Constants: Sp.gr. 2.948.
Soluble in acids; insoluble in water.
Derivation: By the interaction of solutions of sodium arsenate and of a cobalt salt.
Grades: Technical.
Containers: Wooden kegs; boxes.
Uses: Painting on glass and porcelain in light blue colors; coloring glass.
Railroad shipping regulations: None.*
For the mineral see Erythrite.

Cobaltic Chloride (Cobalt chloride) $CoCl_3$.
Color and properties: Ruby-red crystals.
Constants: Sp.gr. 2.94; m.p.: Sublimes.
Soluble in water.
Derivation: By the action of hydrochloric acid on cobaltic oxide with subsequent crystallization.
Method of purification: Recrystallization.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Glass bottles; tins.
Uses: Barometers; hydrometers; galvanoplating; sympathetic inks; ammonia absorbent; gas absorbent in military and industrial gas.
Railroad shipping regulations: None.*

Cobaltic Hydroxide (Cobalt hydroxide; Cobalt hydrate) $Co(OH)_3$.
Color and properties: Dark-brown powder.
Soluble in cold concentrated acids; insoluble in water and alcohol.
Derivation: By the addition of sodium hydroxide to a solution of a cobaltic salt.
Grades: Technical.
Containers: Tins; kegs; glass bottles.
Uses: Cobalt salts.
Railroad shipping regulations: None.*

Cobaltic Oxide (Cobalt oxide) Co_2O_3.
Color and properties: Steel-gray powder.
Constants: Sp.gr. 4.81 to 5.60; m.p.: Decomposes at red-heat.
Soluble in concentrated acids; insoluble in water.
Derivation: By heating cobaltic hydroxide.
Grades: Technical; C.P.
Containers: 1 lb. bottles; cans; wooden barrels.
Uses: Pigment.
Railroad shipping regulations: None.*

Cobaltite (Cobalt glance) CoAsS.
Silver-white to gray mineral, metallic luster. Contains 35.5% cobalt.
Constants: Sp.gr. 6 to 6.1; hardness 5.5.
Occurrence: United States (Oregon), Ontario, Caucasus, Norway, Saxony.
Uses: An important cobalt ore.

Cobaltous Acetate (Cobalt acetate) $Co(C_2H_3O_2)_2.4H_2O$.
Color and properties: Reddish-violet, deliquescent crystals.
Constants: Sp.gr. 1.7043.
Soluble in water.
Derivation: By the action of acetic acid on cobaltous hydroxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; pure crystalline; C.P.
Containers: Glass bottles; barrels.
Uses: Sympathetic inks; ingredient of varnishes used to color oilcloth.
Railroad shipping regulations: None.*

Cobaltous Bromide (Cobalt bromide) $CoBr_2$.
Color and properties: Red crystals.
Constants: Sp.gr. 4.909; m.p.: Decomposes.
Soluble in water, alcohol and ether.
Derivation: By the action of hydrobromic acid on cobalt.
Grades: Technical.
Containers: Glass bottles.
Uses: In hydrometers.
Railroad shipping regulations: None.*

Cobaltous Carbonate (Cobalt carbonate) $CoCO_3$.
Color and properties: Light rose-colored powder.
Constants: M.p.: Decomposes.
Soluble in acids; insoluble in water.
Derivation: By adding sodium carbonate to a solution of cobaltous acetate, followed by filtration and drying.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Manufacturing cobaltic oxide; cobalt pigments; cobalt salts.
Railroad shipping regulations: None.*

Cobaltous Chloride (Cobalt chloride) (a) $CoCl_2$; (b) $CoCl_2.6H_2O$.
Color and properties: Ruby-red crystals, blue when dehydrated.

Constants:	(a)	(b)
Specific gravity	3.348	1.84
Melting-point	Sublimes	86.75°C.

Soluble in water.
Derivation: By the action of hydrochloric acid on cobalt oxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles; tins; 100 lb. kegs.
Uses: Barometers; hydrometers; absorbent for ammonia, gas in military and industrial gasmasks; galvanoplating; sympathetic inks.
Railroad shipping regulations: None.*

Cobaltous Hydroxide (Cobalt hydroxide; Cobalt hydrate) $Co(OH)_2$.
Color and properties: Rose-red powder.
Constants: Sp.gr. 3.597.
Soluble in acids and ammonium salt solutions; insoluble in water and alkalis.
Derivation: By the addition of sodium hydroxide to a solution of a cobaltous salt.
Grades: Technical.
Containers: Tins; kegs; glass bottles.
Uses: Cobalt salts.
Railroad shipping regulations: None.*

Cobaltous Iodide (Cobalt iodide) $CoI_2.6H_2O$.
Color and properties: Brownish-red crystals.
Soluble in water and alcohol.
Derivation: By the action of hydriodic acid on cobalt.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: In hydrometers.
Railroad shipping regulations: None.*

Cobaltous Linoleate (Cobalt linoleate) $Co(C_{18}H_{31}O_2)_2$.
Color and properties: Brown, amorphous powder.
Soluble in alcohol, ether and acids; insoluble in water.
Derivation: By boiling a cobalt salt and sodium linoleate.
Grades: Technical.
Containers: 100 lb. kegs; 350 lb. barrels.
Uses: Varnish driers.
Railroad shipping regulations: None.*

Cobaltous Nitrate (Cobalt nitrate) $Co(NO_3)_2.6H_2O$.
Color and properties: Red crystals, deliquescent in moist air.
Constants: Sp.gr. 1.83; m.p. 56°C.
Soluble in water and in acids.
Derivation: By the action of nitric acid on cobalt with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles; wooden barrels.
Uses: Sympathetic inks; cobalt pigments.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Cobaltous Oleate (Cobalt oleate) $Co(C_{18}H_{33}O_2)_2$.
Color and properties: Brown, amorphous powder.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating cobaltous chloride and sodium oleate, followed by filtration and drying.
Grades: Technical.
Containers: Wooden barrels.
Uses: Varnish driers.
Railroad shipping regulations: None.*

Cobaltous Oxide (Cobalt oxide) CoO.
Color and properties: Blue or black powder.
Constants: Sp.gr. 5.6 to 5.75; m.p. 2,860°C.
Soluble in acids and alkalis; insoluble in water.
Derivation: By heating cobaltous hydroxide.
Grades: Technical.
Containers: 10 lb. tins; 400 lb. barrels.
Uses: Pigment.
Railroad shipping regulations: None.*

Cobaltous Phosphate (Cobalt phosphate) $Co_3(PO_4)_2.2H_2O$.
Color and properties: Pink powder.
Soluble in phosphoric acid; insoluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the interaction of solutions of cobalt salts and sodium phosphate.
Grades: Technical.
Containers: Wooden kegs; glass bottles.
Uses: Manufacturing cobalt pigments; coloring glass; painting on porcelain in light blue colors.
Railroad shipping regulations: None.*

Cobaltous Resinate (Cobalt resinate)
$Co(C_{44}H_{62}O_4)_2$.
Color and properties: Brown powder.
Insoluble in water.
Derivation: By heating a cobalt salt and rosin oil.
Grades: Technical; pure precipitated.
Containers: 300 lb. barrels.
Uses: Varnish drier.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Cobaltous Sulfate (Cobalt sulfate)
(a) $CoSO_4$; (b) $CoSO_4.7H_2O$.
Color and properties: Red powder.

Constants:	(a)	(b)
Specific Gravity	3.472	1.918
Melting-point	989°C.	96.8°C.
Boiling-point	......	420°C.

Soluble in water.
Derivation: By the action of sulfuric acid on cobaltous oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; 100 lb. kegs; 450 lb. barrels.
Uses: Ceramics .
Railroad shipping regulations: None.*

Cobaltous Tungstate (Cobalt tungstate; Cobalt wolframate) $CoWO_4$.
Color and properties: Reddish-orange powder.
Insoluble in water.
Derivation: By adding a sodium tungstate solution to a solution of a cobalt salt.
Grades: Technical.
Containers: Wooden barrels; tins.
Uses: Pigment.
Railrod shipping regulations: None.*

Coca (Erythroxylon; Cuca; Hayo; Ipado).
Dried leaves of Erythroxylon coca, known commercially as Huanaco coca, or Truxillense rusby, known commercially as Truxillo coca. Contains a very small amount of cocaine.
Habitat: Bolivia, Chile and Peru; cultivated in Java and British East and West Indies.
Grades: Huanaco; Truxillo.
Containers: Bags.
Uses: Medicine (an unofficial drug).
Railroad shipping regulations: None.*

Cocain. See Cocaine.

Cocaina, U.S.P. See Cocaine.

Cocainae Hydrochloridum, U.S.P. See Cocaine hydrochloride.

Cocaine (Cocain; Methylbenzoylecgonine)
$C_{17}H_{21}NO_4$.
Color and properties: Colorless crystalline alkaloid; poisonous, habit-forming drug.
Constants: M.p. 98°C.
Soluble in alcohol, chloroform and ether; slightly soluble in water.
Derivation: By extraction of the leaves of Erythroxylon coca with sodium carbonate solution, treatment of the latter with dilute acid and extraction with ether, evaporation of the solvent, re-solution of the alkaloid and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: 5, 10, 15 grain vials; ⅛, ¼, ½, 1 oz. vials; 5, 10, 25, 100 oz. cans.
Uses: Local anesthetic (medicine, dentistry). Sold subject to strict governmental supervision in most countries.
Railroad shipping regulations: None.*

Cocaine Hydrochloride
$C_{17}H_{21}NO_4.HCl$.
Color and properties: White crystals; poisonous, habit-forming drug.
Constants: M.p. 183° to 191° C.
Soluble in water and alcohol; insoluble in ether.
Derivation: By the action of hydrochloric acid on cocaine.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: 5, 10, 15 grain vials; ⅛, ¼, ½, 1 oz. vials; 5, 10, 25, 100 oz. cans.
Uses: Local anesthetic (medicine, dentistry).

Cocaine Oleate. See Oleates.

Cocculus (Fishberry).
Dried ripe fruit of Anamirta cocculus, a woody, climbing plant. Poisonous!
Habitat: India.
Grades: N.F.
Uses: Medicine (vermifuge)—dangerous.

Coccus. See Cochineal.

Cochin Kino. See Kino.

Cochineal (Coccus).
A red coloring matter consisting of the dried bodies of the female insects of Coccus cacti, which live on cactus plants in Mexico, Central America, Algeria and the East Indies. They are collected and killed by heat or sulfur fumes. The coloring principle is carminic acid $C_{17}H_{18}O_{10}$.
Grades: Technical; U.S.P.; silver grain; black grain.
Containers: Boxes.
Uses: Coloring food and medicinal products, toilet preparations, manufacture of red and pink lakes and carmine; indicator in analytical chemistry; inks; dyeing.
Railroad shipping regulations: None.*

Cochineal, Ammoniacal. Dark brown tablets consisting of a coloring matter obtained by digesting cochineal with ammonia and precipitating the solution with aluminum nitrate.

Cochrome. A chromium-cobalt alloy.

Cocillana (Guapi bark).
Dried bark of tree, Guarea rusbyi.
Habitat: Bolivia.
Grades: N.F.
Uses: Medicine (bronchitis).

Cocoa. See Cacao products.

Cocoa Butter. See Cacao butter.

Cocoa Oil. See Cacao butter.

Cocoa Shells. See Cacao shells.

Cocoanut Oil. See Coco-nut oil.

Coco-nut Butter. See Coco-nut oil.

Coco-nut Fiber. See Coir.

Coco-nut Oil (Coco-nut palm oil, Cocoanut oil; Coco-nut butter).
Color and properties: White, semi-solid, lard-like fat; characteristic odor.
Constants: Sp.gr. 0.9115; saponification value 250 to 258; iodine value 8.9; m.p. 20°C. to 28°C.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: From the coco-nut (Cocos nucifera), the chief commercial supply coming from India, Ceylon and the South Sea Islands. The fresh meat of the nut is pressed, boiled in water or heated with solvents and the oil extracted.
Method of purification: Filtration.
Grades: Crude; refined; Ceylon; Cochin; Manila. Free fatty acid content: 2%; 5%; 7%; 72%.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: 375, 400 lb. barrels; 1,000 lb. casks; 8,000 gal. tank cars.
Uses: Soaps; butter substitutes; foodstuffs; cosmetics; candles; emulsions; dyeing cotton.
Railroad shipping regulations: None.*
See also Copra oil.

Coco-nut Palm Oil. See Coco-nut oil.

Cocoic Ether. See Ethyl cocoinate.

Cocoinic Ether. See Ethyl cocoinate.

Codeine (Methylmorphine)
(a) Alkaloid: $C_{18}H_{21}NO_3.H_2O$.
(b) Hydrochloride: $C_{18}H_{21}NO_3.HCl.2H_2O$.
(c) Phosphate: $C_{18}H_{21}NO_3PO_4.2H_2O$.
(d) Sulfate: $(C_{18}H_{21}NO_3)_2.H_2SO_4.5H_2O$.
Color and properties: Colorless or almost colorless crystals; poisonous!
Constants: M.p. (a) 154.9°C.; (b) 264°C.; (c) 235°C.; (d) 278°C.
(a) Soluble in water, alcohol and ether.
(b) Soluble in water.
(c) Soluble in water; slightly soluble in ether and alcohol.
(d) Soluble in water; insoluble in alcohol and ether.
Derivation: From opium by extraction and subsequent crystallization. The salts are obtained by the action of the respective acid on the alkaloid.
Method of purification: Recrystallization.
Color and properties: Colorless crystals.
Grades: Technical; U.S.P.
Containers: ⅛, ¼, ½, 1 oz. vials; 5, 25, 100 oz. cans.
Uses: Medicine.
Railroad shipping regulations: None.*

Codeine Bromomethylate. See Eucodin.

Codeonal. A mixture of codeine and sodium diethylbarbiturates in the proportion of 2 parts to 15 parts. Stated to give the combined sedative actions of codeine and barbital.
Uses: Medicine (analgesic, somnifacient, cough sedative, unofficial).

Cod-liver Oil (Morrhua oil).
Color and properties: Yellowish-brown to reddish-brown, liquid, fixed, non-drying oil; characteristic odor.
Chief constituents: Glycerides of jecolic and therapic acids.
Constants: Sp.gr. 0.922 to 0.930; saponification value 182 to 189; iodine value 141 to 159; maumené test 102 to 113; acid value 204 to 207.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: From the livers of the codfish (Gadus morrhua), which are rendered by steam heat and the oil separated and chilled until the stearin solidifies, when it is pressed and the clear oil collected.
Method of purification: Filtration.
Grades: U.S.P.; pale; light-brown; dark-brown.
Containers: 5 gal. cans; 30, 50 gal. barrels; 8,000 gal. tank cars.
Uses: Medicine (for its vitamine content); leather dressing; chamois leather tanning.
Railroad shipping regulations: None.*

Codoil. See Rosin oil.

Coelestin. See Celestite.

Coffea. See Coffee.

Coffee (Coffea; Caffea).
Dried ripe seed of Coffea arabica or C. liberica.
Habitat: Arabia; cultivated in Brazil, Java, India, Hawaii, Central America.
Uses: Roasted, for preparation of a drink by percolation.

Coffeine. See Caffeine.

Cognac Ether. See Ethyl cocoinate.

Cognac Oil. See Oenanthic ether.

Cohosh. See Caulophyllum.

Cohosh, Black. See Cimicifuga.

Cohune-nut Oil. See Cohune oil.

Cohune Oil (Cohune-nut oil; Cahoun oil; Cahune oil; Corozo-nut oil).
Color and properties: Yellowish, fixed, semi-liquid fat.
Constants: M.p. 18° to 20°C.; saponification value 253.9; iodine number 12.9 to 13.6.
Soluble in ether and benzene; insoluble in water.
Derivation: From the cohune-nut, Attalea cohune, by expression.
Grades: Technical.
Containers: Tins.
Uses: Candles; soap; substitute for coco-nut oil in cooking, etc.
Railroad shipping regulations: None.*

Coir (Coco-nut fiber). The fiber from the coco-nut shell. Used as a filler in rope.

Coke (Petroleum coke). Coal from which the volatile constituents have been driven off by heat, air or oxygen being excluded, so that the fixed carbon and the ash are fused together and remain as coke. Commonly artificial, but natural coke is also known. New Mexico and Virginia.

Coke-oven Gas.
A gas obtained in the production of coke by the by-product coke-oven process. Approximate composition:

	Per Cent
Hydrogen	55
Methane	30
Carbon monoxide	6
Carbon dioxide	2
Illuminants	3

Cola (Kola; Kola nuts; Kola seeds; Soudan coffee; Guru).
Derivation: Seeds of Cola nitida or other species of Cola.
Habitat: West Africa, West Indies, Ceylon and India.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (for its caffeine content).
Railroad shipping regulations: None.*

Colchicine $C_{22}H_{25}NO_6$.
Color and properties: Yellow crystalline alkaloid or amorphous powder; poisonous!
Constants: M.p. 142.5°C.
Soluble in water, alcohol and chloroform; moderately soluble in ether.
Derivation: From Colchicum autumnale by extraction and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: ⅛, 1 oz. vials; 5, 10, 15 grain vials.
Uses: Medicine.
Railroad shipping regulations: None.*

Colchicum (Meadow saffron; Autumn crocus; Wild saffron; Meadow crocus).
Dried corm or seed of Cholchicum autumnale.
Habitat: Central and southern Europe and North Africa.
Grades: Technical; U.S.P.
Containers: Bales.
Uses: Extraction of colchicine.
Railroad shipping regulations: None.*

Colcothar. Similar to Venetian red (q.v.).

Colemanite (Neocolemanite) $Ca_2B_6O_{11}.5H_2O$.
A natural hydrated calcium borate. Color, white or colorless; white streak; vitreous to dull luster. Contains 50.9% B_2O_3, 27.2% CaO, balance water. Priceite and pandermite correspond to the formula $Ca_5B_{12}O_{23}.9H_2O$ and have been regarded as impure varieties but they have now been identified as distinct from colemanite.
Constants: Sp.gr. 2.26 to 2.48; hardness 4 to 4.5.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Occurrence: United States (California).

Uses: Now the chief raw material in the United States for commercial borax, boric acid, etc. See Sodium borate.

Colic Root. See Aletris.

Collargol (Colloidal silver; Argentum credé).

Color and properties: Bluish-black, scale-like pieces. A colloidal form of silver and silver oxide stabilized by egg albumin. Contains approximately 80% silver.

Soluble in water (stable when protected from light and heat).

Uses: Medicine (antibacterial, unofficial).

Railroad shipping regulations: None.*

See also Silver, colloidal.

Collaurin (Colloidal gold).

Derivation: Soluble gold in finely divided form.

Grades: Pure.

Containers: Glass bottles.

Uses: Antiseptic.

Railroad shipping regulations: None.*

Collaurum. A form of colloidal gold.

Collene. Colloidal silver suspension containing 5 mg. of silver per cc. Used in medicine as an antibacterial. Unofficial. See also Silver, colloidal.

Colliers. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
B	B	I a
B, L.F.	A	I a
C, L.F.	A	I a
X, I.F. 2	A	I a
11	A	I a

Railroad shipping regulations: High explosive.

Collin. A product used in the analysis of tanning materials. It is made by heating caustic soda with either hide powder or gelatin and neutralizing the product with acetic acid.

Colloidal Clay. See Bentonite.

Collodion.

Derivation: Solution of nitrated cellulose (mixture of trinitrocellulose and tetranitrocellulose) in ether and alcohol.

Color and properties: Pale yellow, syrupy liquid; very inflammable.

Grades: Technical; U.S.P.

Containers: Glass bottles; 1, 5, 6, 10 lb. cans; 30, 60 lb. drums.

Uses: Photographic films; cementing; coating wounds and abrasions; patent and artificial leather; solvent for drugs; corn removers; process engraving and lithography; artificial pearls.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label.

Collodion, Blistering (Collodion, cantharidal).

A solution of flexible collodion and cantharides in acetic ether. Used in medicine as an epipastic.

Collodion, Cantharidal. See Collodion, blistering.

Collodion Cotton. See Nitrocellulose.

Collodion, Flexible. Collodion to which camphor and castor oil have been added.

Collodion Wool. A name sometimes applied to a weakly nitrated cellulose used in the manufacture of celluloid and blasting gelatin.

Colloidal Gold. See Collaurin.

Colloidal Silver. See Collargol.

Colloxylin. See Nitrocellulose.

Colmenthol. See Menthylethylglycocolate.

Colocynth (Bitter apple; Bitter cucumber; Bitter gourd).

Peeled, dried, unripe fruit of Citrullus colocynthis.

Habitat: Mediterranean region, Asia and Africa.

Grades: Technical; U.S.P.

Containers: Boxes.

Uses: Medicine (powerful cathartic).

Railroad shipping regulations: None.*

Colocynthin (Citrullin). The bitter principle of Colocynth.

Cologne Brown. See Vandyke brown.

Cologne Earth. See Vandyke brown.

Cologne Glue. See Glue and gelatin.

Cologne Spirits. A very pure grade of ethyl alcohol.

Cologne Yellow. See Chrome yellows.

Colonial Spirits. A purified methyl alcohol (q.v.) similar to Columbian spirits (q.v.).

Colophony (Common rosin; Pine resin).

Derivation: A resin obtained as a residue after the distillation of turpentine oil from crude turpentine.

Constants: Sp.gr. 1.08; m.p. 100° to 150°C.

Chief constituents: Isomeric forms of the anhydride of abietic acid.

Grades: "Virgin"; yellow dip; hard. Rosin is graded B, C, D, E, F, G, H, I, K, L, M, N, W-G (window-glass), W-W (water-white). The grading is done by color, B being the darkest and W-W the lightest rosin. Ordinarily the first three grades, B, C and D are not separated. Occasionally (e.g., in the case of rosin used for shrapnel) factors other than color are considered in the grading, such as the acidity and the melting-point.

Containers: Barrels.

Uses: The darker grades, B, C and D, are used for making rosin oil, and also in the manufacture of linoleum and dark varnishes; E, F and G (especially F) are used for making size for the paper industry; the grades G to K are used in the manufacture of soap, depending on the quality of the soap being made; for some fine soaps even lighter grades are occasionally used; the grades higher than K (especially W-G and W-W) are used for making light varnishes; sealing wax; munitions (shrapnel); adulterating other resins; fastening cutlery into handles; increasing the friction of the horsehair of the bows of musical string instuments; soldering flux.

Railroad shipping regulations: None.*

Coloradoite HgTe.

Iron-black mineral sometimes mottled with blue or purple. Found in small amounts with gold and silver tellurides. Contains 61.5% mercury, 38.5% tellurium.

Constants: Sp.gr. 8.6; hardness 3.00.

Occurrence: United States (Colorado) Australia.

Color Lakes.

Insoluble compounds produced by the absorption or precipitation of a coloring principle on an inert and insoluble base. The base is almost invariably inorganic and generally, although not always, white or transparent. Formerly the term, commercially, was applied only to those colors fixed on a transparent base, but to-day the term is understood to embrace also those colors fixed on any inert base whose natural color does not injure the desired shade of the lake. Color lakes are used extensively in the preparation of printing inks, lithographic inks, paints, and in the printing of wall paper and such materials.

Colors. See Dyes.

Coltsfoot. See Farfara.

"Columbian" Black. See under Blacks.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Columbian Spirits. A high-grade methanol (q.v.) free from empyreumatic odor and with only a slight trace of acetone as impurity.

Columbite (Tantalite; Niobite) $(Fe,Mn)(Cb,Ta)_2O_6$.

A natural, variable columbate and tantalate of iron and manganese covered by the above general formula. It may contain preponderant columbium or graduate into tantalite in which tantalum preponderates. Tin and tungsten are also present in small amounts. Color may be iron-black, grayish- or brownish-black, rarely reddish-brown, luster submetallic, often very brilliant, subresinous. Streak dark red to black. $FeCb_2O_6$ contains 82.7% columbium pentoxide and 17.3% iron protoxide. $FeTa_2O_6$ contains 86.1% tantalum pentoxide and 13.9% iron protoxide. Found in granite pegmatites, cryolite and feldspar.

Constants: Sp.gr. 5.3 to 7.3; hardness 6.

Occurrence: United States (Maine, New Hampshire, Massachusetts, Connecticut, New York, Pennsylvania, Virginia, North Carolina, Colorado, South Dakota, California), Bavaria, Finland, France, Russia, Greenland, Madagascar.

Uses: Source of tantalum.

Columbium (Niobium) Cb. A rare metal, related to vanadium and tantalum, occurring in nature in the form of columbates, in columbite and other rare minerals.

Columbo. See Calumba.

Columnian Spirits.

A purified methanol (q.v.) similar to Columbian spirits (q.v.).

Colza Oil. See Rape-seed oil.

Colza Oil, Mineral. Name given to a mineral burning oil. See Burning oils, mineral.

Colzarine Oil. A mineral burning oil. See Burning oils, mineral.

Common Brick Clay. See under Clays.

Common Canna. See Canna.

Common Guava. See Guava.

Common Opal. See Opal.

Common Rosin. See Colophony.

Compounded Oils. Special formula oils compounded of such materials as will impart to the final product qualities which will enable it to stand up under given conditions of service, e.g., non-chatter oils. Some of these oils consist of mineral lubricating oils with which "blown" cottonseed or rape-seed oil have been mixed in order to increase viscosity; others consist of mixtures of animal oil and mineral-cylinder oils; while some of the less viscous mineral lubricating oils may have artificial viscosity imparted to them by the addition of rosin oil or aluminum soaps.

See also Lubricants, United States Government Master Specification.

Compressor Oils, Air.

Color and properties: A straight-reduced, viscous, neutral oil. Compressor oils are sometimes artificially colored to a violet tint.

Constants: Gr. 30.5° to 31°Bé.; Saybolt viscosity 215 to 210; solidifying point below —20°C.; flash point 140° to 180°C.

Railroad shipping regulations: None.*

Conarachin.

A globulin containing amino acids. Derived with arachin from peanut meal. After arachin has been removed conarachin is obtained by dialysis and subsequently is purified in same manner as arachin. Differs from arachin largely in sulfur content.

Conchinine. See Quinidine.

Concrete (Béton). A conglomerate of gravel, pebbles, broken stone, blast-furnace slag or cinders, termed the aggregate, embedded in a matrix of either mortar or cement. Ancient and medieval concretes had lime-mortar matrices but cement is used for modern concretes. Reinforced concrete, ferro-concrete, and armoured concrete are concretes in which steel in various forms is used to strengthen the concrete. Only the best quality cement must be used in this form of concrete and the aggregate must be of a hard and undecomposable nature, while the sand must be clean and sharp and free from clayey matter. Mild steel is usually used in such forms as rods, bars, expanded metal, wire netting, etc., the ends of the rods and bars being often bent in order to increase the resistance to shearing forces.

Concrete Form Oils.

Non-viscous neutral oils.

Constants of one satisfactory oil: Gr. 34°Bé.; flash point 340°F.; fire test 400°F.; cold test 20°F.; Saybolt viscosity 80.

Railroad shipping regulations: None.*

Concrete Oil of Mangosteen. See Kokum butter.

Concrete Waterproofing Oils. Summer black oils (q.v.) are stated to be satisfactory for this purpose.

Condensed Asphalts. See Blown asphalt.

Condensite. A synthetic resin produced by condensing phenol and formaldehyde.

Condor Vine. See Condurango.

Condres de Varech. A French name for seaweed ash.

Condurango (Cundurango; Eagle vine; Mata-perro; Condor vine).

Bark of Marsdenia cundurango.

Habitat: Ecuador and Peru.

Grades: Technical; N.F.

Containers: Bales.

Uses: Medicine; poison.

Railroad shipping regulations: None.*

Condy's Liquid. A solution of aluminum permanganate with some aluminum sulfate, made by dissolving potassium permanganate and aluminum sulfate in hot water, cooling, and removing the crystallized potash alum. Used as a disinfectant.

Cone Flower. See Echinacea.

Confections. Pharmacal preparations in the form of a soft solid, in which one or more medicinal substances is incorporated with saccharin matter, with a view either to their preservation or more convenient administration.

Congluten.

Color and properties: White powder; contains 18% nitrogen and 0.6% sulfur; used as a 6% solution.

Soluble in weak alkaline solutions.

Derivation: A vegetable casein derived from almonds.

Uses: Medicine (endovenous nutrition, unofficial).

Railroad shipping regulations: None.*

Conhydrine (Oxyconiïne) $C_8H_{17}NO$.

Color and properties: Colorless crystalline alkaloid; poisonous!

Constants: M.p. 120.6°C.; b.p. 220° to 225°C.

Soluble in alcohol and ether and chloroform; slightly soluble in water.

Derivation: By extraction of the seeds of Conium maculatum and subsequent crystallization.

Method of purification: Recrystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Conhydrine, Pseudo $C_8H_{17}NO$.

Color and properties: Colorless crystalline alkaloid; poisonous!

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: M.p. 101° to 102°C.; b.p. 230°C.
Soluble in water, alcohol, ether and benzene.
Derivation: By extraction of seeds of Conium maculatum and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Coniferin. A glucoside contained in pine bark. When decomposed it yields coniferyl alcohol which can be oxidized to vanillin. Used as a raw material for manufacture of synthetic vanillin.

Coniïne (Propyl pyridine) $C_8H_{17}N$.
Color and properties: Colorless, oily liquid alkaloid; mousy odor; poisonous!
Constants: M.p. —2.5°C.; b.p. 166°C.
Soluble in alcohol, ether and oils; slightly soluble in water.
Derivation: By extraction of Conium maculatum and subsequent distillation.
Grades: Technical; N.F.
Containers: Glass bottles.
Uses: Medicine (in form of base or hydrochloride, hydrobromide, etc., as antispasmodic).
Railroad shipping regulations: None.*

Coniïne Hydrochloride $C_8H_{17}N.HCl$.
Color and properties: White crystals; poisonous!
Constants: M.p. 208° to 210°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: By the action of hydrochloric acid on coniïne.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Conium (Hemlock; Poison hemlock; Spotted hemlock; Poison parsley; Spotted cowbane.
Derivation: Full grown, but unripe carefully dried fruit of Conium maculatum.
Habitat: Europe, Asia and United States.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Source of coniïne.
Railroad shipping regulations: None.*

Consumptive's Weed. See Eriodictyon.

Contact Acid. Sulfuric acid (q.v.) made by the contact process.

Contact Process. See Sulfuric acid.

Convallaria (Lily-of-the-valley; May lily; Park lily; May blossom).
Dried rhizome and roots of Convallaria majalis.
Habitat: United States, Europe and northern Asia; cultivated in United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (emetic and cathartic).
Railroad shipping regulations: None.*

Convertit. Proprietary name for invertase (sucrase). An enzyme preparation derived from yeast. A brownish-yellow liquid. Active principle inverts cane sugar.
Soluble in water; insoluble in alcohol.
Derivation: Yeast is autolyzed, and extracted with water.
Containers: Tin cans; glass bottles.
Uses: As an inverting agent for cane sugar in the confectionery industry.
Railroad shipping regulations: None.*

Convolvulus. See Rose wood.

Copaiba Oil.
Color and properties: Essential oil; colorless to yellowish or bluish; characteristic copaiba-balsam, pepper-like odor; bitter, grating, lingering taste.
Constituents: A sesquiterpene, caryophyllene.
Derivation: Distilled from copaiba balsam.
Constants: Copaiba balsams are classified, commercially, according to the port of export and the properties of the various oils distilled therefrom show considerable variation. Para and Maracaibo balsam oils are the most important.
Varieties:
Para balsam oil. Sp.gr. 0.886 to 0.910 (15°C.); optical rotation —7° to —33°; refractive index 1.493 to 1.502; acid value 0 to 1.9; ester value 0 to 4; soluble in 5 to 6 vols. 95% alcohol.
Maracaibo balsam oil. Sp.gr. 0.900 to 0.905 (15°C.); optical rotation —2° 30′ to —12°; refractive index 1.498 (about); acid value 0.9 to 1.0; ester value 1 to 1.6; soluble in 5 to 6 vols. 95% alcohol.
Bahia balsam oil. Sp.gr. 0.888 to 0.909 (15°C.); optical rotation —8° to —28°; refractive index 1.494 to 1.497; acid value 0.5 to 7.9; ester value to 4; soluble in 5 to 10 vols. 95% alcohol.
Marnaham balsam oil. Sp.gr. 0.896 to 0.905 (15°C); optical rotation —1° 30′ to —22°.
Cartagena balsam oil. Sp.gr. 0.894 to 0.910 (15°C.); optical rotation —2° 30′ to —23°.
Maturin balsam oil. Sp.gr. 0.899 to 0.904 (15°C.); optical rotation —7° 30′ to —10° 10′; refractive index 1.497 to 1.500; acid value 0 to 0.6; ester value 0.9 to 3.6; soluble in 5 to 6 vols. 95% alcohol.
Containers: 1, 5, 10 lb. bottles; 25, 50 lb. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Copaiba Resin (Jesuits' balsam; Copaiba balsam; Balsam capivi).
Color and properties: Transparent, viscous, light-yellow to brownish-yellow liquid; peculiar odor.
Constants: Sp.gr. 0.940 to 0.990.
Soluble in alcohol, ether, chloroform, benzene and carbon bisulfide; insoluble in water.
Derivation: The oleoresin from one or more South American species of Copaiba.
Habitat: Brazil, Venezuela and Columbia.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; 10, 50-55 lb. cans.
Uses: Medicine (as a laxative and in gonorrhea); varnishes; lacquers; brightening old paintings; tracing papers; tracing cloths.
Railroad shipping regulations: None.*

Copal (Copal resin; Animé; Kaurie; Cowrie).
Color and properties: Yellowish to yellowish-brown lumps of varying size; hard or soft in consistency; conchoidal fracture; odorless and tasteless.
Chief constituents: Trachylolic acid, resene, dammaran.
Habitat: Zanzibar (both fossil and recent), Manila, West Indies and Australia.
Soluble in oil of turpentine and linseed oil, after fusion. Hard copals are almost insoluble in the usual solvents. Soft copals are partly soluble in alcohol, chloroform and glacial acetic acid.
Grades: Technical.
Containers: Tins; bags.
Uses: Varnishes and lacquers; cements; amber substitute; ingredient of the mass used to coat the textile under fabric of oilcloth and linoleum.
Railroad shipping regulations: None.*

Copal Oils. Oils sometimes used in the preparation of oil varnishes. They are obtained by the dry distillation of copal.
Railroad shipping regulations: None.*

Copper Cu.
Color and properties: Reddish, lustrous, flexible, ductile, malleable, hard metal; sometimes found native. See also Azurite, Atacamite, Azurmalachite, Bornite, Brochantite, Chalcanthite, Chalcocite, Chalcopyrite, Chrysocolla, Covellite, Cuprite, Enargite, Famatinite, Freibergite, Goldfieldite, Linarite, Malachite, Melaconite,

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Stromeyerite, Tennantite, Tenorite and Tetrahedrite.

Constants: Sp.gr. 8.96; m.p. 1,083°C.; b.p. 2,310°C.

Soluble in hot concentrated sulfuric acid, hot concentrated nitric acid and dilute nitric acid; slightly soluble in dilute sulfuric acid, ammonium hydroxide and organic acids; very slightly soluble in hydrochloric acid; insoluble in cold concentrated nitric acid, water and alcohol.

Derivation: By roasting the ore to drive off sulfur and other volatile matter, the oxide remaining. This is reduced with carbon and a siliceous flux in a puddling furnace or cupola, furnishing the "matte" of commerce containing 40 to 50% of copper. The matte is bessemerized in a converter, "poled" with wood to remove occluded gases, yielding "blister" copper, containing 96 to 98% of the metal. This is melted and cast into "anode" plates for electrolytic refining.

Method of purification: The electrolytic refining is carried out by the "series system" in which one side of the anode plate serves as anode and the other as cathode. After a suitable amount of pure metal has been deposited on the cathode side, the plates are "stripped," i.e. the remaining anode material is split off. The cathode metal is melted and cast into ingots of varying sizes. These ingots are 99.90 to 99.94% pure, and are the usual commercial form of copper for the metal-working industries.

Corrosion resistance: See under Copper, deoxidized.

Forms available: Cathodes; ingots; sheet; plate; strip; rod; wire; shot; angles and shapes; seamless tubes; brazed tubes; castings; ingot bars; cakes; wirebars; billets; slabs; wedge cakes; pipe fittings; valves; forgings; wire cloth; screening.

Uses:

Chemical and pharmaceutical machinery: Agitators, autoclaves, baffles, belts, blades, blow cases, burner tips, burners, chlorinators, chutes, coils, condensers, containers, conveyors, coolers, crystallizers, digesters, dryers, evaporators, fans, filling machines, filters, fittings, fusion pots, gas scrubbers, heating coils, heating equipment, hoppers, jacketed kettles, kettles, knives, laboratory apparatus, linings, mixers, pipe lines, pots, pumps, pump rods, screens, shafts, springs, stills, tanks, trays, trucks, vacuum pans, valves, vats. all kinds of special equipment

Electrical industry:

Copper is used for electrical purposes almost to exclusion of other materials.

Miscellaneous industries: Dairy industry, oil-burning industry, cooking utensils, marine industry, pulp and paper, printing, washing machines, radio, lighting fixtures, automobile, bearing, airplane, copper-bearing steel, railroad, refrigeration, farming, textile, laundry, and many other industries are all large users of copper and its alloys.

Building materials: Electrical installations, valves, pipes and fittings, roofing, ventilators, flashings, downspouts, window sash, screening, hardware, plumbing and heating equipment, water heaters and tanks, pumps and pump valves.

Copper Abietinate (Cupric abietinate) $Cu(C_{19}H_{27}O_2)_2$.

Color and properties: Green scales; poisonous!

Soluble in alcohol, and in oils, with fine green color; insoluble in water.

Derivation: By heating copper hydroxide with abietinic acid.

Grades: Technical.

Containers: Kegs.

Uses: Wood preservative.

Railroad shipping regulations: None.*

Copper Acetate (Cupric acetate; Crystals of Venus). $Cu(C_2H_3O_2)_2.H_2O$.

Color and properties: Greenish-blue, fine powder; poisonous!

Constants: Sp.gr. 1.9; m.p.: Decomposes at 240°C.

Soluble in water, alcohol and ether.

Derivation: By the action of acetic acid on copper and subsequent crystallization.

Method of purification: Recrystallization.

Grades: Technical; C.P.

Containers: 1, 5 lb. bodies; wooden barrels; kegs.

Uses: Medicine; insecticide; fungicide; textiles; ceramics; reagent in analytical chemistry.

Railroad shipping regulations: None.*

Copper Acetate, Basic (Copper subacetate; Verdigris).

Color and properties: Masses of minute silky crystals either pale green or bright blue in color. Blue variety, approximate formula $(C_2H_3O_2)_2 Cu_2O$. Green variety, approximate formula $CuO.2Cu(C_2H_3O_2)_2$. Coppery taste. Poisonous! The green rust with which uncleaned copper vessels become coated and which is commonly termed verdigris is a copper carbonate and must not be confused with true verdigris. Apart from its impurities verdigris is a variable mixture of the basic copper acetates.

Soluble in water and acids; insoluble in alcohol.

Derivation: By the action of acetic acid on copper.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs.

Uses: Paint pigment; insecticide; fungicide; dyeing and printing fabrics; copper acetoarsenite.

Railroad shipping regulations: None.*

Copper Acetoarsenite (Cupric acetoarsenite; Paris green; Schweinfurth green; Imperial green; King's green; Emerald green; New green; Patent green; Moss green; Mitis green; Vienna green; Emperor green; Parrot green; Kaiser green; Meadow green) $(CuOAs_2O_3)_3.Cu(C_2H_3O_2)_2$.

Color and properties: Emerald-green powder; poisonous!

Soluble in acids; insoluble in alcohol and water.

Derivation: By boiling copper basic acetate with arsenic trioxide.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden kegs.

Uses: Pigment; insecticide; wood preservative preparations.

Railroad shipping regulations: Class B poison.

Copper, Aluminated (Divine stone).

A combination of copper and aluminum sulfates with potassium nitrate. Soluble in water. Used as a mild caustic in ophthalmology.

Copper Aminosulfate. See Copper-ammonium sulfate.

Copper-ammonium Sulfate (Cupric-ammonium sulfate; Ammonio-cupric sulfate; Copper aminosulfate) $CuSo_4.4NH_3.H_2O$.

Color and properties: Dark blue, crystalline powder.

Constants: M.p.: Decomposes.

Soluble in water; insoluble in alcohol.

Derivation: By dissolving copper sulfate in ammonium hydroxide and precipitating with alcohol.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden kegs.

Uses: Calico printing; manufacturing copper arsenate; insecticide "azurin"; coloring druggists' show globes.

Railroad shipping regulations: None.*

Copper Arsenite (Cupric arsenite; Copper orthoarsenite; Scheele's green) $CuHAsO_3$.

Color and properties: Fine, light-green powder; poisonous!

Constants: M.p.: Decomposes.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in acids; insoluble in water.
Derivation: By the interaction of copper sulfate and sodium arsenite.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Pigment (paints, wall paper, calico printing); insecticide.
Railroad shipping regulations: Class B poison.

Copper, Blister. See Copper under "Derivation".

Copper Blue. See Mountain blue and Bremen blue.

Copper Borate (Cupric borate) $CuBO_4$.
Color and properties: Bluish-green, crystalline powder.
Soluble in water.
Derivation: By the interaction of copper hydroxide and boric acid.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; kegs; tins.
Uses: Oil pigments; painting on porcelain; insecticides (especially wheat-rust compounds).
Railroad shipping regulations: None.*

Copper Carbonate (Cupric carbonate; Artificial malachite; Mineral green. For the native mineral see Malachite) $Cu_2(OH)_2CO_3$.
Color and properties: Green powder; poisonous!
Constants: Sp.gr. 3.7 to 4.0.
Soluble in acids; insoluble in water.
Derivation: By adding sodium carbonate to a solution of copper sulfate, filtering and drying.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300, 400 lb. barrels.
Uses: Pigments; pyrotechnics; insecticides; copper salts; coloring brass black; astringent in pomade preparations; antidote for phosphorus poisoning.
Railroad shipping regulations: None.*

Copper Carbonate, Basic, Hydrated. See Azurite.

Copper Carbonate, Blue. See Azurite.

Copper Carbonate, Hydrated Basic. See Azurite.

Copper, Chessy. See Azurite.

Copper Chlorate (Cupric chlorate) $Cu(ClO_3)_2 . 6H_2O$.
Color and properties: Bluish-green, deliquescent crystals; poisonous! Keep dry.
Constants: M.p. 65°C.
Soluble in water and alcohol.
Derivation: By the interaction of copper hydroxide and chloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Mordant in dyeing and printing fabrics.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Copper Chloride (Cupric chloride)
(a) $CuCl_2$; (b) $CuCl_2 . 2H_2O$.
Color and properties: (a) Yellow powder; (b) greenish-blue, deliquescent crystals; poisonous!
Constants: Sp.gr. (a) 3.054; (b) 2.47. M.p. (a) 498°C.
Soluble in water.
Derivation: (a) By the union of copper and chlorine. (b) Copper carbonate is dissociated with hydrochloric acid and the product is crystallized.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300 lb. barrels.
Uses: Chemical (oxidizing agent; catalyst in Deacon chlorine process); mordant in dyeing and printing fabrics; sympathetic ink; disinfectant; pyrotechnics; wood preservation; metallurgy (refining copper, gold, silver, recovering mercury from its ores by the wet process, electroplating copper on aluminum); chrome brown; preservation of pulpwood and ground pulp; deodorizing and desulfurizing petroleum distillates; photography; water purification.
Railroad shipping regulations: None.*

Copper Chromate (Basic cupric chromate) $CuCrO_4 . 2CuO . 2H_2O$.
Color and properties: Light chocolate-brown powder; poisonous!
Soluble in nitric acid; insoluble in water.
Derivation: By the action of chromic acid on copper hydroxide.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyeing (mordant).
Railroad shipping regulations: None.*

Copper Cyanide (Cupric cyanide) $Cu(CN)_2$.
Color and properties: Green powder; exceedingly poisonous! Keep well stoppered!
Soluble in acids and alkalis; insoluble in water.
Derivation: By the addition of potassium cyanide to a solution of copper sulfate, cupric cyanide is precipitated. This is dried, but is not stable and gives off cyanogen, leaving cuprous cyanide.
Grades: Technical.
Containers: Barrels; kegs.
Uses: Metallurgy; intermediates (introduction of the cyanide group in place of the amino radical in aromatic organic compounds).
Railroad shipping regulations: None.*

Copper, Deoxidized. The product of one company contains 99.9+% copper and 0.01% phosphorus. Another company reports 99.9+% copper. The former product is stated to offer fair resistance to dilute solutions of sulfuric acid and hydrochloric acid (in absence of air), good resistance in the absence of air to acetic acid, good resistance to hot and cold sodium hydroxide and to sea water and moist sulfurous atmospheres. The latter is stated to offer good resistance to very dilute sulfuric acid (up to 2.5% in cold; 0.5% in hot) and very dilute nitric acid in the cold, to acetic acid in the absence of air, to hot and cold 0.5% sodium hydroxide and to sea waters and moist sulfurous atmospheres.

Copper, Electrolytic. Copper refined by electrolysis. The purest form of copper available.

Copper Fluoride (Cupric fluoride) $CuF_2 . 2H_2O$.
Color and properties: Blue crystals; poisonous!
Soluble in water, alcohol and acids.
Derivation: By decomposing copper carbonate with hydrofluoric acid and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Ceramics; enamels.
Railroad shipping regulations: None.*

Copper Fluosilicate. See Copper silicofluoride.

Copper Glance. See Chalcocite.

Copper Glance, Argentiferous. See Stromeyerite.

Copper Green. See Verte antique.

Copper Hemioxide. See Copper oxide, red.

Copper Hydrate. See Copper hydroxide.

Copper Hydroxide (Cupric hydroxide; Hydrated copper oxide; Copper hydrate) $Cu(OH)_2$.
Color and properties: Blue powder; poisonous!
Constants: Sp.gr. 3.368; m.p.: Decomposes.
Soluble in acids; insoluble in water.
Derivation: By the interaction of a solution of a copper salt and an alkali.
Grades: Technical.
Containers: Wooden kegs.
Uses: Copper salts; mordant; cuprammonium rayon; pigment; staining paper.
Railroad shipping regulations: None.*

Copper, Indigo. See Covellite.

Copper Monoxide. See Copper oxide, black.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Copper Nitrate (Cupric nitrate)
(a) $Cu(NO_3)_2.3H_2O$;
(b) $Cu(NO_3)_2.6H_2O$.
Color and properties: Blue, deliquescent crystals; poisonous!
Constants: Sp.gr. (a) 2.174; (b) 2.074. M.p. (a) 114.5°C.; (b) 26.4°C.
Soluble in water and alcohol.
Derivation: By treating copper or copper oxide with nitric acid. The solution is evaporated and product recovered by crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. crocks; wooden barrels; kegs.
Uses: Medicine; preparation of light-sensitive papers for reproductive processes; analytical reagent; dyes; insecticide for vines; coloring copper black; electroplating; production of burnished effect on iron; paints, varnishes, enamels; pharmaceutical preparations; textiles.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Copper Nucleinate. See Cuprol.

Copper Oleate (Cupric oleate) $Cu(C_{18}H_{33}O_2)_2$.
Color and properties: Brown powder or greenish-blue mass; poisonous!
Soluble in ether; insoluble in water.
Derivation: (a) By the interaction of copper sulfate and sodium oleate. (b) By dissolving 10% copper oxide in oleic acid.
Grades: Technical.
Containers: Tins.
Uses: Medicine; preserving fish nets and lines.
Railroad shipping regulations: None.*

Copper Ore, Gray. See Fahlore.

Copper Ore, Pitchy.
A mixture of chrysocolla (q.v.) and limonite (q.v.).
Occurrence: Chile.
Uses: Source of copper.

Copper Ore, Plush. See Cuprite.

Copper Ore, Purple. See Bornite.

Copper Ore, Ruby. See Cuprite.

Copper Ore, Yellow. See Chalcopyrite.

Copper Ortho-arsenite. See Copper arsenite.

Copper Oxide, Black (Cupric oxide; Copper monoxide) CuO. For native black copper oxide see Tenorite.
Color and properties: Brownish-black, amorphous powder.
Constants: Sp.gr. 6.32; m.p. 1,064°C.
Soluble in acids; insoluble in water.
Derivation: By the ignition of copper carbonate or copper nitrate.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 25 lb. boxes; 100 lb. keg; 1,000 lb. barrels.
Uses: Producing green or blue colors on glass, faience, porcelain and stoneware; reagent in analytical chemistry; insecticide for potato plant; catalyst in the reduction of organic compounds; purification of hydrogen; batteries and electrodes; aromatic acids from cresols; electroplating; solvent for chromic iron ores; imitation precious stones; antifouling paints; desulfurizing oils; rayon.
Railroad shipping regulations: None.*

Copper Oxide, Hydrated. See Copper hydroxide.

Copper Oxide, Red (Cuprous oxide; Copper protoxide; Copper hemioxide; Copper suboxide) Cu_2O. For the native ore see Cuprite.
Color and properties: Reddish-brown crystalline powder.
Constants: Sp.gr. 5.75 to 6.09; m.p. 1,210°C.; b.p. 1,800°C.
Soluble in acids and alkalis; insoluble in water.
Derivation: (a) By the oxidation of finely divided copper. (b) By the addition of bases to cuprous chloride. (c) By the action of glucose on cupric hydroxide.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. cans; 25 lb. boxes; 100 lb. kegs; 1,000 lb. barrels.
Uses: Copper salts; ceramics; porcelain red glaze; red glass; electroplating.
Railroad shipping regulations: None.*

Copper Phenolsulfonate. See Cupriaseptol.

Copper Phosphide (Cuprous phosphide) Cu_3P_2.
Color and properties: Grayish-black, metallic powder.
Constants: Sp.gr. 6.67.
Soluble in acid; insoluble in water.
Derivation: By heating copper and phosphorus.
Grades: Technical.
Containers: Wooden kegs.
Uses: Manufacturing phosphor-bronze.
Railroad shipping regulations: None.*

Copper Plating. A process for the production of a coating of substantially 100% pure copper on a metallic cathode. This process is carried out in an aqueous electrolyte, using copper anodes. Copper plating baths are of two types. The alkaline or cyanide bath in which copper is present as the cyanide is always used when copper is to be plated on die castings and on iron or steel, and is preferred for plating over brass or bronze. The acid bath, in which copper is present in the electrolyte as copper sulfate, is used for plating copper over nickel or over copper previously deposited on steel from the cyanide bath.

Alkaline Electrolytes. Typical electrolytes of the alkaline type are given below together with the usual temperatures of operation, current densities and voltages.

	Approximate Normality	Grams per Liter	Ounces per Gallon
Copper cyanide $[Cu(CN)_2]$	0.25	22.5	3
Sodium cyanide (NaCN)	0.60	30.0	4
Sodium carbonate (Na_2CO_3)	0.30	15.0	2

Of the sodium cyanide used, 0.25 N (12 grams/liter, or 1.6 oz./gal.) is required to combine with the copper cyanide, and 0.35 N (18 grams/liter, or 2.4 oz./gal.) is "free cyanide." Sodium thiosulfate (hypo) is usually added in small amounts, for example, about 0.12 to 1.0 gram/liter, or 1/64 to 1/8 oz./gal., as frequently as it is needed to maintain a bright deposit. An excess should be avoided as it causes darkening of the deposit and is apt to cause the formation of blisters. This solution is usually operated at 40° to 50°C. (104° to 122°F.) and at a current density of about 2.8 to 5.6 amperes/square decimeter (3 to 6 amperes/square foot). If the concentration of the bath is increased, higher current densities can be used. Higher temperatures also permit the use of higher current densities, but have this disadvantage: the decomposition of sodium cyanide with the formation of sodium carbonate proceeds much more rapidly at higher temperatures. If the concentration of free sodium cyanide is permitted to fall too low, for example, normality of free cyanide lower than the normality of sodium copper cyanide, the deposit tends to be dark and of poor physical properties. This condition can be remedied by adding more sodium cyanide. When the concentration of sodium cyanide is too great in proportion to the concentration of sodium copper cyanide, the current efficiency is greatly decreased.

The concentration of sodium carbonate gradually increases during the course of operations. If the concentrations of copper cyanide and sodium cyanide are properly adjusted, however, the presence of excessive amounts of sodium carbonate does not seem to be especially disadvantageous, and in usual practice no efforts are made to remove the excess of sodium carbonate. It may be removed, however, by cooling the solution and crystallizing out some of the excess sodium carbonate. When facilities for doing this are not available, the concentration can, of course, be lowered by discarding some of the solution and adding water and as much copper cyanide and sodium cyanide as may be required to restore these materials to the proper concentration.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Acid Electrolytes. Typical electrolytes and operating data for the acid copper plating solutions are as follows:

	Normality	Grams per Liter	Ounces per Gallon
Copper sulfate	1.50 to 2.00	180 to 240	24 to 32
Sulfuric acid	1.20 to 2.00	60 to 100	8 to 13

Small amounts of organic or colloidal materials, such as dextrin, black strap molasses, or gelatin are sometimes added to improve the character of the deposit, and produce finer crystal structure. Such addition materials should, however, be used with caution.

The plating solution is usually operated at about 25°C. (77°F.), although higher temperatures up to 35°C. (95°F.) are permissible if higher current densities are employed. For soft deposits the current density may be as low as 0.5 ampere/square decimeter (4.5 amperes/square foot), although current densities 2 to 10 times as great are often employed. Agitation of the bath, or movement of the work in the bath is practiced if the current is greater than 3 amperes/square decimeter (28 amperes/square foot).

For electrotyping the more concentrated solutions and current densities up to 10 amperes/square decimeter (93 amperes/square foot) may be employed, and the solution is agitated. The more dilute baths are favored, however, for lower current densities such as are more generally used in general electroplating.

Current Efficiencies. The cathode current efficiency from the acid type bath is usually better than 99%. From the alkaline bath it will vary from 45 to 80% in usual commercial practice. Higher current efficiencies are obtained by the use of lower concentrations of free cyanide and higher current densities. This, however, tends to give copper of dark color, possibly containing some oxide, and of less desirable physical properties. For example, such deposits are harder to buff and less likely to be smooth.

Throwing Power. When any irregularly shaped article is made the cathode in a plating bath, certain parts are nearer to the anode than others, and hence will naturally receive higher current densities. Suppose that in any given case the resistance from the anode to the far point on the cathode is five times as great as to the near part. Then, according to Ohm's law, the current density on the near part would be five times as great as on the far part. Such a distribution, which exists only when there is no polarization at the cathode (e.g., when a high-frequency alternating current is used), is known as the "primary current distribution." It is determined solely by the size, shape, and position of the anodes and cathodes and of the bath, and does not depend upon the solution used.

The polarization produced at the cathode depends, however, both on the nature of the solution and on the actual current density on each part of the cathode. In consequence, the current density at a near point on the cathode is less than it would be if there were no polarization, and the current distribution may be, for example, 4.5 to 1, instead of 5 to 1. The "secondary current distribution" is that which is actually produced, and is always more nearly uniform than the primary distribution.

In solutions of metals which stand below hydrogen in the electromotive series, the cathode efficiency decreases as the current density is increased, hence there is relatively more hydrogen and less metal deposited at high than at low current densities. In consequence, the "metal distribution" is often more nearly uniform than the actual or secondary current distribution, e.g., it may be 4 to 1, instead of 4.5 to 1. Thus, if in the above illustration the primary ratio is 5 to 1, and the metal ratio is 4 to 1, the throwing power would be 20%, that is, the percentage improvement in the distribution ratio is 20%. This is equivalent, in a simple case, to the statement that while depositing the required thickness of metal on the least accessible part, 20% less metal will be deposited on the near part than if there were no throwing power.

The acid type baths may have a throwing power of from 9.4% at 1 ampere/square decimeter to 7.2% at 2 amperes/square decimeter. Agitation or increase of concentration of the solution decreases throwing power. Colloidal addition agents increase the throwing power. The alkaline baths have much better throwing power, especially at low current density and temperature. The throwing power under usual conditions may be as high as 40%.

Anodes. Anodes for either electrolyte should be of purest copper (99.9% Cu). Hot-rolled copper, in oval shapes, is usually preferred, although flat or rectangular anodes are also used. Electrolytic cathode copper is not favored because of its tendency to separate loose particles of nodules of copper.

Agitation of Baths. The alkaline copper plating baths are rarely agitated. The acid bath, however, is always agitated for electrotyping and is often agitated for electroplating. Agitation has the advantage of reducing the likelihood of getting so-called burned deposits, and therefore permits of the use of higher current densities.

Tanks. Steel tanks, preferably of lap-welded construction, are used for plating from the alkaline baths. For the acid baths the tanks may be either of steel or wood, but must be lined. Asphaltic compositions will serve, particularly with wood tanks, when the temperature is kept low. However, it is preferable to use lead linings for wooden tanks and either lead or rubber linings for steel tanks.

Copper Precipitate. Trade name for copper used in electrolytic processes.

Copper Protoxide. See Copper oxide, red.

Copper Pyrites. See Chalcopyrite.

Copper Resinate (Cupric resinate)
$Cu(C_{20}H_{29}O_2)_2$.
Color and properties: Green powder; poisonous!
Soluble in ether and oils; insoluble in water.
Derivation: By heating copper sulfate and rosin oil and filtering and drying the precipitate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Preservative metal paint, particularly for ships' bottoms.
Railroad shipping regulations: None.*

Copper Scale. A coating which forms on copper after heating. It is composed of a mixture of cupric and cuprous oxides.

Copper Silicide. See Silicon-copper.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Copper Silicofluoride (Copper fluosilicate; Cupric fluosilicate; Cupric silicofluoride)
$CuF_2SiF_4 \cdot 6H_2O$.
Color and properties: Blue, hygroscopic crystals; poisonous!
Constants: Sp.gr. 2.182.
Soluble in water; slightly soluble in alcohol.
Derivation: By the interaction of copper hydroxide and hydrofluosilicic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyeing and hardening white marble; treating grape vines for "white disease."
Railroad shipping regulations: None.*

Copper Stearate (Cupric stearate) $Cu(C_{18}H_{36}O_2)_2$.
Color and properties: Light blue, amorphous powder; poisonous!
Soluble in ether, chloroform, benzene and turpentine; insoluble in water.
Derivation: By the interaction of copper sulfate and sodium stearate.
Grades: Technical.
Containers: Wooden kegs; tins.
Uses: Bronzing plaster statues.
Railroad shipping regulations: None.*

Copper Subacetate. See Copper acetate, basic.

Copper Suboxide. See Copper oxide, red.

Copper Sulfate (Cupric sulfate; Blue vitriol; Blue stone; Blue copperas)
$CuSO_4 \cdot 5H_2O$.
Color and properties: Blue crystals, slowly efflorescing in air; almost white when dehydrated; poisonous! Found in nature as chalcanthite (q.v.).
Constants: Sp.gr. 2.284.
Soluble in water and alcohol.
Derivation: (a) By the action of dilute sulfuric acid on copper or copper oxide in large quantities, with evaporation and crystallization. (b) Heating copper with sulfur in presence of air.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. boxes; 100 lb. kegs; 250, 350, 450, 500 lb. barrels.
Uses: Textile mordant; leather industry; germicides; insecticides; pigments; electric batteries; electrolytic baths; copper salts; hair dyes; reagent in analytical chemistry; medicine (emetic, astringent, tonic); improving casein glues; wood preservative; preservation of pulp wood and ground pulp; process engraving and lithography; destroying algae and low forms of animal life in drinking water. The anhydrous salt is used as a dehydrating agent.
Railroad shipping regulations: None.*

Copper Sulfate, Native Basic. See Brochantite.

Copper Sulfide (Cupric sulfide) CuS.
Color and properties: Grayish-blue powder or lumps; found as such in nature.
Constants: Sp.gr. 3.18 to 4.16; m.p. 1,100°C.
Soluble in nitric acid; insoluble in water.
Derivation: By passing hydrogen sulfide gas into a solution of a copper salt.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Copper metal; protective paint for vessels.
Railroad shipping regulations: None.*

Copper Sulfide (Cuprous sulfide) Cu_2S.
Color and properties: Black powder or lumps; found as such in nature.
Constants: Sp.gr. 5.52 to 5.82.
Soluble in nitric acid; insoluble in water.
Derivation: By heating cupric sulfide in a stream of hydrogen.
Grades: Technical.
Containers: Wooden barrels.
Uses: Copper metal; protective paint for vessels.
Railroad shipping regulations: None.*

Copper Sulfocarbolate. See Cupriaseptol.

Copperas, White. See Zinc sulfate.

Copper Trisalyt. Trade name for a copper sulfate preparation used in electroplating.

Copper Uranite. See Torbernite.

Copper, Yellow. See Chalcopyrite.

Copperah Oil. See Copra oil.

Copperas. See Ferrous sulfate.

Copperas, Blue. See Copper sulfate.

Copperas, Green. See Ferrous sulfate.

Copperas, White. See Zinc sulfate.

Copra.
Derivation: The dried meat of coco-nut. Obtained from the South Sea Islands and the East Indies.
Grades: Cebu; Java; Macassar; South Sea; spot, sundried Pacific coast and Padang.
Containers: Bags.
Uses: For the extraction of coco-nut oil; confectionery; food.
Railroad shipping regulations: None.*

Copra Oil (Copperah oil; Coco-nut oil, not the same as coco-nut palm oil; often erroneously called cocoa-nut oil).
Color and properties: White, wax-like, semi-solid; somewhat disagreeable odor; mild taste.
Chief constituents: Trymyristin and trilaurin.
Constants: Sp.gr. 0.910 to 0.926; m.p. 23° to 27°C.; iodine number 8 to 9; saponification value 251 to 268; refractive index 1.441.
Soluble in alcohol and ether; insoluble in water.
Derivation: From the dried meat of the coconut, Cocus nucifera, by boiling and pressing.
Method of purification: Decolorization with boneblack or fullers' earth.
Grades: Technical.
Containers: Boxes; wooden barrels.
Uses: Soap; candles; food; medicine.
Railroad shipping regulations: None.*
See also Coco-nut oil.

Coprolites. Phosphatic nodules consisting of mixtures of calcium phosphate and calcium carbonate derived from the excrements of certain extinct fishes and reptiles. They were formerly used as phosphatic manures but are now rarely used due to the availability of sources of cheaper phosphates. They are mostly found in England and France, the best English grades containing up to 55 to 60% tricalcium phosphate and the French varieties containing a lower amount of phosphate.
Railroad shipping regulations: None.*

Coptis (Gold thread; Golden thread).
Dried plant of Coptis trifolia.
Habitat: Canada, south to Maryland; north Asia.
Grades: Technical.
Containers: Bales.
Uses: Medicine (bitter tonic).
Railroad shipping regulations: None.*

Coquina. A porous, coarse limestone composed of fragments of marine shells. Found in Florida.

Coracite. A partially altered uraninite (q.v.).

Coral. Skeletons of the coral polyps, Anthozoa, consisting, mainly, of calcium carbonate, colored with ferric oxide.

Corba Oil (Sphagnol). A black, tarry product used in medicine (unofficial) as an external antiseptic. It is obtained by distilling peat.

Cordage Oil. Usually a non-viscous neutral oil similar to concrete form oil (q.v.) in properties.

Cordeine (Methyl tribromosalol).
Color and properties: Small white crystals.
Soluble in alcohol and chloroform; insoluble in water.
Uses: Medicine (intestinal antiseptic, unofficial).

Cordierite. See Iolite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Cordol (Tribromosalol)
$C_6H_4OHCOOC_6H_2Br_3$.
Color and properties: White powder; odorless; tasteless.
Soluble in chloroform and glacial acetic acid; insoluble in water, ether and alcohol.
Uses: Medicine (intestinal antiseptic, unofficial).
Railroad shipping regulations: None.*

Cordyl (Acetyl tribromosalol).
Color and properties: Fine white needles.
Insoluble in water.
Uses: Medicine (intestinal antiseptic, unofficial).

Core Oils.
One satisfactory oil is stated to consist of a vegetable oil compounded with a pale yellow, sun-bleached neutral oil possessing the following constants: Gr. 36° Bé.; flash point 260°F.; fire test 320°F.; cold test 20°F.; Saybolt viscosity 55.
Railroad shipping regulations: None.*

Coriander.
Dried, ripe fruit of Coriandrum sativum.
Habitat: Native to Italy; cultivated in India, Asia Minor, north Africa, and the United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (weak aromatic); condiment.
Railroad shipping regulations: None.*

Coriander Oil.
Color and properties: Colorless or slightly yellowish liquid; characteristic, aromatic odor; warm, spicy taste.
Chief known constituents: Linalol; pinene.
Constants: Sp.gr. 0.863 to 0.878; refractive index 1.4665.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the fruit of Coriandrum sativum.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: Tins; glass bottles.
Uses: Flavoring material.
Railroad shipping regulations: None.*

Coriander Oil, Terpeneless.
Concentration: About 1.5 to 2.5 times that of the ordinary coriander oil.
Solubility in alcohol: 25 vols. in 100 vols. of 60% alcohol; 60 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Coriandrol. Impure linalol.

Cork. The light, porous, outer bark of the variety of oak tree known as cork-oak (Quercus suber).
Habitat: Southern Europe, northern Africa.
Uses: Filler; stoppers; insulation; sound deadener; life preservers; gaskets, etc.

Cork, Mountain. A term applied to a variety of asbestos which floats on water.

Cork Black. A pigment obtained by charring cork.

Corkboard. A mixture of ground cork and paper pulp formed into thick sheets. Used for sound and heat insulation.

Corkstone. A stone made by mixing ground cork and a suitable mineral material, which also acts as the binder. It is fireproof and has sound- and heat-insulating properties.

Corn. In United States: Indian corn or maize; in England: oats or other grain.

Corn Oil (Maize oil).
Color and properties: Pale yellow liquid; characteristic taste.
Constants: Sp.gr. 0.920 to 0.925; saponification value 188 to 193; iodine value 111 to 123.
Soluble in ether, chloroform, amyl acetate, benzene and carbon bisulfide.
Derivation: The germ of common corn (Indian corn, Zea mays) is removed from the grain and pressed.
Method of purification: Filtration.
Grades: Crude; refined.
Containers: 375 lb. wooden barrels; 8,000 gal. tank cars.
Uses: Foodstuffs; soap; lubricants; leather dressing; rubber substitutes; lard substitutes (by hydrogenation).
Railroad shipping regulations: None.*

Corn-oil Pitch. See Stearin and fatty acid pitch.

Corn-oil-foots Pitch. See Stearin and fatty acid pitches.

Corn Silk. See Zea.

Corn Starch. See Starch.

Corn Sugar. See Dextrose.

Corn Syrup. See Glucose.

Cornish Clay. See under Clays.

Cornish Stone. A partially weathered feldspar, used as a flux and fusible ingredient in porcelain and tiles.

Cornus. See Dog-wood.

Cornutine Citrate. Brownish-black powder, obtained from ergot, slightly soluble in water and alcohol. Used in medicine (unofficial) for treament of hemorrhoids, etc.

Coronadite. A natural manganate of lead and manganese $(Mn,Pb)Mn_3O_7$. Resembles psilomelane in general aspect. Found in Arizona.

Corozo-nut oil. See Cohune oil.

Corrosive Sublimate. See Mercuric chloride.

Corubin. A trade name for an artificial aluminum oxide obtained as a by-product in the thermit process.

Corundum Al_2O_3.
Vari-colored mineral usually containing about 95 to 99% Al_2O_3 with small amounts of inorganic impurities, e.g., ferric oxide, magnesia, silica, chromium, water, etc.
Constants: Sp.gr. 3.95 to 4.10; hardness 9.
Classified in three varieties:
Precious Corundum. Vividly colored gem stones: true and oriental ruby (red), oriental topaz (yellow), oriental emerald (green), sapphire (blue), oriental amethyst (purple). The term "sapphire" is often used to cover all colors of corundum gem stones except red.
Occurrence: United States (Montana, North Carolina), Upper Burma, Siam, Ceylon, India, Australia.
Used for gem stones.
Ordinary Corundum or Adamantine Spar. Light blue to gray, brown or black.
Occurrence: United States (Appalachian range from Alabama to Massachusetts. Greatest development in North Carolina and Georgia.), Canada, Madagascar, South Africa, Sweden, India, Russia.
Used for abrasives, now meeting competition from the artificial electric furnace products.
Emery. An impure variety consisting essentially of 50 to 60% corundum, 30 to 40% magnetite with small and variable amounts of other minerals. Dull black, dark gray or bluish black color. Sp.gr. 3.75 to 4.31.
Occurrence: United States (New York, Massachusetts), Greece, Asia Minor (Smyrna).
Used for various kinds of polishing and abrasive operations.
See also Alumina.

Corydalis (Turkey or Squirrel corn; Dutchman's breeches).
Dried tubers of perennial herb, Dicentra canadensis and D. cucullaria.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Habitat: Eastern United States.
Grades: N.F.
Uses: Medicine (tonic, antisyphilitic).

Coryfin. See Menthylethylglycocolate.

Cosalite. A natural sulfide of lead and bismuth, $Pb_2Bi_2S_5$. Contains 42% bismuth. Found in Colorado, Utah and Washington.

Cosmin. See Salicyl-alpha-methylphenylhydrazine.

Cosmoline. See Petrolatum.

Costra. The layer immediately below the surface layer in caliche beds. It is separated from the caliche by the layer called conjelo. Costra is a kind of low-grade caliche running from 5 to 17% sodium nitrate. See also Caliche.

Cotarnine Chloride (Cotarnine hydrochloride; Stypticin) $C_{12}H_{14}NO_3Cl$.
Color and properties: Yellow crystalline powder; poisonous!
Constants: M.p. 142° to 144°C.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on an alkaloid prepared from narcotine by oxidation with nitric acid.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine (for uterine hemorrhage).
Railroad shipping regulations: None.*

Cotarnine Phthalate. See Styptol.

Cotinin. See Fustic.

Cotoin (Methyl trioxybenzophenone; Benzoylphloroglucinol ether) $C_{14}H_{12}O_4$.
Color and properties: Crystals.
Soluble in alcohol, chloroform, acetone, benzene, carbon bisulfide and hot water; sparingly soluble in cold water; insoluble in petroleum benzine.
Derivation: By subjecting an ethereal extraction of powdered true coto bark to the action of warm petroleum benzine, decanting, evaporating the benzine spontaneously and permitting the mixture to stand until clear.
Uses: Medicine (diarrheas of catarrh, tubercular ulceration, typhoid fever, unofficial).
Railroad shipping regulations: None.*

Cotton, Animalized. Cotton which has been subjected to a certain special processing which renders it more easy to dye. The fiber is treated with casein, or other nitrogenous matter, followed by treatment with alum and ammonia.

Cotton Ball. See Ulexite.

Cotton-root Bark. See Gossypium bark.

Cottonseed Cake.
The cakes formed in the press when the seeds are subjected to hydraulic pressure in order to express the cottonseed oil. They are used as a cattle food and fertilizers.
Railroad shipping regulations: None.*

Cottonseed Foots. See Cottonseed oil.

Cottonseed Foots Pitch. See Stearin and fatty acid pitches.

Cottonseed Meal.
The mealy form assumed by cottonseed after the crushing and heating operations preparatory to the expression of the oil in either the hydraulic presses or the expeller. If the oil cake is ground, the product again is in this mealy form. Contains 7 to 9% ammonia, 2 to 3% phosphoric acid, 1.5 to 2% potash. The best grades are used for cattle food and the off-grades for fertilizer.
Railroad shipping regulations: None.*

Cotton-seed Oil (Seed oil; Cotton-seed stearno).
Color and properties: Pale yellow or yellowish-brown to dark ruby-red or black-red, fixed, non-drying oil depending on the nature and condition of the seed.
Constants: Sp.gr. 0.922 to 0.930; saponification value 191 to 196; iodine value 101 to 116.
Soluble in ether, benzene, chloroform and carbon bisulfide.
Derivation: The seeds of the cotton plant (Gossypium herbaceum) are crushed in a mill, the meal is heated in iron kettles at 75° to 90°C. and pressed in cloths, under 3,000 to 4,000 lbs. per sq. in. The press cake is sold as a cattle food. The oil, after settling, is refined by being heated with a solution of caustic soda, to separate the foots. The sediment of "foots" containing lye, coloring matter and albuminous bodies, settles to the bottom. The "foots" are used for soap. The cottonseed oil is clarified by filtration. On standing, or by chilling below 12°C., the palmitin and stearin in part crystallize and are removed by pressing. This solid fat is known as "cotton-seed stearno" and is used in making oleomargarine.
Method of purification: Filtration.
Grades: Crude; refined; prime summer yellow; bleachable; U.S.P.
Containers: 375 lb. barrels; 8,000 gal. tank cars.
Uses: Medicine; leather dressing; soap stock; lubricant; producing carron oil; glycerol; base for cosmetic creams; food (oleomargarine and butter substitutes, in solid state as lard substitute, salad oil, cooking oil, packing sardines); waterproofing compositions; phonograph records.
Railroad shipping regulations: None.*

Cottonseed-oil Pitch. See Stearin and fatty acid pitches.

Cotton Seed Stearno. See Cottonseed oil.

Cotton-stearin Pitch. See Stearin and fatty acid pitches.

Couch Grass. See Triticum.

Coumarin (Cumarin; Tonka bean camphor; ortho-oxycumaric anhydride) $C_9H_6O_2$.
Color and properties: Colorless crystals, flakes or powder; fragrant odor.
Constants: M.p. 67°C.; b.p. 290°C.
Soluble in alcohol, ether, chloroform, and fixed volatile oils; slightly soluble in water.
Derivation: (a) By heating salicylic aldehyde, sodium acetate and acetic anhydride. (b) Fine grades are isolated from Tonka beans.
Method of purification: Crystallization.
Grades: Technical; N.F.
Containers: 1, 5, 20 lb. tins.
Uses: Flavoring; perfumery (fixative); pharmaceutical preparations.
Railroad shipping regulations: None.*

Coumarone, Para- (Resin) (Cumaron resin; Benzofurane resin; "Cumar"; Indene) C_6H_4CHOCH.
Color and properties: A resinous body varying from pale yellow to dark red-brown in color. Consists of a mixture of para-coumarone, para-indene, meta-styrene, etc., depending upon its source.
Constants: Sp.gr. 1.05 to 1.10; m.p. 45° to 200°C., depending upon source; b.p.: Decomposes at about 250°C.
Soluble in ether, coal-tar and petroleum solvents, turpentine, pyridine, acetone, carbon bisulfide and carbon tetrachloride; insoluble in water and alcohol.
Derivation: Polymerization of solvent naphtha by means of heat or mineral acids.
Method of purification: Removal of volatile oils by distillation.
Impurities: Unpolymerized coumarone and indene; inorganic matter.
Grades: Varying in consistency from soft and gummy to hard and brittle, and from dark to light in color, according to degree of purification.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Cans; barrels; boxes.
Uses: Compounding rubber goods; chicle substitutes for chewing gum, etc.; paints, varnishes and enamels; manufacture of molded goods; insulating materials.
Railroad shipping regulations: None.*

Coumarouna Bean. See Tonka.

Covellite (Indigo copper) CuS.
Dark indigo-blue mineral, lead-gray to black streak, submetallic to resinous luster. Often shows fine purplish color when moistened. A mineral of secondary origin found in the enriched portions of copper sulfide veins. Contains 66.44% copper, 33.56% sulfur. Soluble in nitric acid; slowly soluble in hydrochloric acid.
Constants: Sp.gr. 4.59 to 4.64; hardness 1.5 to 2.
Occurrence: United States (Montana, Wyoming, California, Colorado, Utah, Alaska), Germany, Servia, Chile, Japan.
Uses: Source of copper.

Cowbane. See Cicuta.

Cowrie. See Copal.

Cramp Bark. See Viburnum opulus.

Cranberry Tree. See Viburnum opulus.

Cranes-bill. See Geranium.

Crank Case Oils.
One textbook cites the following:
Gas engine crank cases:
Viscous, neutral oils of 30.5 to 32°Bé. gravity are suitable for this purpose.
Steam engine crank cases:
Gr. 26° to 27°Bé.; flash point 455°F.; Saybolt viscosity 100 at 212°F. has proved satisfactory for this service.
Railroad shipping regulations: None.*
See also Lubricants, United States Government Master Specifications.

Cream Caustic. A low-grade caustic soda from tank liquor.

Cream of Tartar. See Potassium bitartrate.

Cream-separator Oils.
The following are stated by one text book to be suitable:
For hand separators:
Non-viscous, neutral oils of gravity 34° to 35°Bé.; flash point 340°F.; fire test 400°F.; cold test 20°F.; Saybolt viscosity 70 to 80.
For steam separators:
Viscous, neutral oils of gravity 30.5° to 32°Bé.; flash point 400° to 415°F.; fire test 460° to 480°F.; cold test 20°F.; Saybolt viscosity 145 to 215.
Railroad shipping regulations: None.*

Cremnitz White. See White, Cremnitz.

Crems White. See White, Cremnitz.

Creolin (Cresoline; Sanatol; Kresosolvin).
A disinfectant consisting of a cresol-rosin soap solution. It mixes in all proportions with absolute alcohol, chloroform and ether, but forms a milky emulsion with water. It is considerably less toxic than phenol although it is from two to four times stronger. Phenol coefficient, without organic matter 3.25, with organic matter 2.52.
Railroad shipping regulations: None.*

Creosal. See Creosote tannate.

Creosotal. Trade name for a commercial preparation of Creosoti carbonas (q.v.).

Creosote, Beechwood.
Color and properties: Colorless or faintly yellow, oily liquid; characteristic smoky odor; caustic, burning taste.
Constants: Sp.gr. 1.080; b.p. 205° to 220°C.
Miscible with alcohol, ether, and fixed or volatile oils.
Derivation: A mixture of phenols and phenol derivatives obtained by the destructive distillation of wood-tar, preferably that of Fagus sylvatica or Fagus ferruginea.
Grades: Technical; U.S.P.
Containers: Iron drums; blue or amber bottles.
Uses: Medicine (antiseptic); poison; ore-flotation agent.
Railroad shipping regulations: None.*

Creosote Carbonate. See Creosoti carbonas, U.S.P.

Creosote, Coal-tar (Creosote oil; Liquid pitch oil).
Color and properties: Yellowish to dark green-brown, oily liquid; clear at 38°C. or higher; characteristic odor; poisonous! Frequently contains substantial amounts of naphthalene and anthracene.
Constants: Sp.gr. 103 to 110; distilling range 200° to 400°C.
Soluble in alcohol, benzene and toluene.
Derivation: (a) Directly by the fractional distillation of coal-tar. (b) By redistillation of a coal-tar fraction. (c) A coal-tar oil from which the phenols and naphthalene have been partly extracted. (d) A mixture of two or more coal-tar fractions.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; tank cars.
Uses: Wood preservative; disinfectants.
Railroad shipping regulations: None.*

Creosote Oil. See Creosote, coal-tar.

Creosote Tannate (Kreosal; Creosal; Tannocreosote).
Color and properties: Brown, amorphous powder containing 60% creosote.
Soluble in water, glycerol and alcohol.
Derivation: By heating together to 80°C. pure tannin and beechwood creosote in equal quantities, adding phosphorus oxychloride and purifying.
Uses: Medicine (internal antiseptic astringent, diarrhea, phthisis, unofficial).
Railroad shipping regulations: None.*

Creosoti Carbonas, U.S.P. (Creosote carbonate).
Color and properties: Clear, colorless or yellowish, viscous liquid; slight creosote odor and taste, or odorless and tasteless.
Soluble in alcohol; insoluble in water.
Derivation: Mixture of carbonates of various constituents of creosote, obtained by subjecting a solution of creosote and sodium hydroxide to the action of carbonyl chloride.
Containers: 1 lb. bottles.
Uses: Medicine (chronic bronchitis, tuberculosis, unofficial).
Railroad shipping regulations: None.*
See also Creosotal.

Cresatin (Cresylacetate, meta-)
$CH_3C_6H_4OCH_3CO$.
Color and properties: Colorless, oily liquid.
Soluble in immiscible solvents; insoluble in water.
Uses: Medicine (antiseptic, analgesic, unofficial).
Railroad shipping regulations: None.*

Cresidine $C_8H_{11}NO$.
Color and properties: White crystals.
Constants: M.p. 51.5°C.; b.p. 235°C.
Soluble in alcohol and ether; sparingly soluble in hot water.
Derivation: 2-nitro-para-cresol, obtained by the action of nitrous and excess nitric acids upon para-toluidine, is methylated and reduced.
Method of purification: Distillation.
Grades: Technical.
Containers: Drums.
Uses: Dyes.
Railroad shipping regulations: None.*

Cresoform. A formaldehyde-creosote condensation product used in medicine as an antiseptic. Unofficial.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Cresol Cinnamate, Meta-. See Hetocresol.

Cresol Iodide. See Iodocresol.

Cresol, Meta- (Meta-cresylic acid; Meta-oxytoluene; Meta-methylphenol; Meta-kresol; Cresylic acid) $CH_3C_6H_4OH$.
Color and properties: Colorless to yellowish liquid; phenol-like odor; poisonous!
Constants: Sp.gr. 1.0419; m.p. 10.9°C.; b.p. 202°C.
Soluble in alcohol, ether and chloroform; slightly soluble in water.
Derivation: By fractional distillation of crude cresol.
Method of purification: Rectification.
Grades: Technical.
Containers: 5, 10, 25, 40 lb. cans; 100 lb. carboys; 400 lb. barrels; 450, 850 lb. drums.
Uses: Disinfectant; fumigating compositions; production of synthetic resins; photographic developer; nitrocresol explosives.
Railroad shipping regulations: None.*

Cresol, Meta-Para-. A mixture of approximately 40% meta-cresol with 60% para-cresol.

Cresol, Ortho- (Cresyl alcohol; Ortho-cresylic acid; Ortho-oxytoluene; Ortho-methylphenol; Ortho-kresol) $CH_3C_6H_4OH$.
Color and properties: White crystals; phenol-like odor; poisonous!
Constants: Sp.gr. 1.0511; m.p. 30.4°C.; b.p. 191°C.
Soluble in alcohol, ether and chloroform; slightly soluble in water.
Derivation: By fractional distillation of crude cresol.
Method of purification: Crystallization.
Grades: Technical.
Containers: 5, 10, 25, 40 lb. cans; 100 lb. carboys; 400 lb. barrels; 450, 850 lb. drums.
Uses: Disinfectant; coumarin.
Railroad shipping regulations: None.*

Cresol, Para- (Para-cresylic acid; Para-oxytoluene; Para-methylphenol; Para-kresol) $CH_3C_6H_4OH$.
Color and properties: Crystalline mass; phenol-like odor; poisonous!
Constants: Sp.gr. 1.039; m.p. 36°C.; b.p. 202°C.
Soluble in alcohol, ether and chloroform; slightly soluble in water.
Derivation: (a) By fractional distillation of crude cresol. (b) By fusing para-toluenesulfonic acid with potassium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: 5, 10, 25, 40 lb. cans; 100 lb. carboys; 400 lb. barrels; 450, 850 lb. drums.
Uses: Disinfectant; fumigating compositions; cresotinic acid; dyestuffs.
Railroad shipping regulations: None.*

Cresol, U.S.P.
A mixture of ortho-, meta- and para-cresols, obtained by fractional distillation from the portion of coal-tar boiling between 190° and 210°C.

Cresol, Saponified. A cresol-soap disinfectant. Phenol coefficient, without organic matter 1.03, with organic matter 0.57.
Railroad shipping regulations: None.*

Cresol Triïodide. See Losophan.

Cresoleum. A cresol-soap disinfectant. Phenol coefficient, without organic matter 2.90, with organic matter 1.75.
Railroad shipping regulations: None.*

Cresoline. See Creolin.

Cresotic Acid (Cresotinic acid; Cresotic acid; Kresotic acid) $C_6H_3COOHOHCH_3$.
Color and properties: White or reddish-white powder; mixture of ortho-, meta- and para-acids.
Constants: M.p. 151°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From creosote oil.
Method of purification: Rectification.
Grades: Technical.
Containers: Wooden kegs.
Uses: Disinfectant; starting point in dye synthesis; artificial tannins (by condensation with formaldehyde).
Railroad shipping regulations: None.*

Cresotic Acid. See Acid cresotic.

Cresotinic Acid. See Acid cresotic.

Cresyl Alcohol. See Cresol, ortho-.

Cresylacetate, Meta-. See Cresatin.

Cresylic Acid, Meta-, Ortho-, Para-. See corresponding cresol.

Cresylol. See Cresol.

Crispmint (Balm mint; Mentha crispa; Curled mint; Cross mint).
Derivation: Leaves of Mentha crispa.
Habitat: Germany.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Cristite I. A ferrous alloy containing 66% iron, 17% tungsten, 10% chromium, 3.5% carbon and 2.5% molybdenum. It offers good resistance to cold concentrated sulfuric and nitric acids, cold acetic acid in all concentrations, ammonium and sodium hydroxides in all concentrations, and mine waters.

Crocar. A ferrous alloy containing in addition to iron 12% chromium, 2.15% carbon, 0.75% vanadium and 0.75% cobalt. It offers good resistance to abrasion.

Crocidolite $NaFe(SiO_3)_2FeSiO_3$.
A natural sodium-iron silicate. One of the amphibole group of minerals. Color, lavender-blue or leek-green; streak, same. One of the commercial forms of asbestos (q.v.). See also Tiger's eye.

Crocoisite. See Crocoite.

Crocoite (Crocoisite) $PbCrO_4$.
Bright hyacinth-red mineral with orange-yellow streak and adamantine to vitreous luster. A secondary mineral found in veins of lead ore, sometimes associated with gold. Contains 31.1% CrO_3, 68.9% PbO. Soluble in nitric acid.
Constants: Sp.gr. 5.9 to 6.1; hardness 2.5 to 3.
Occurrence: United States (Arizona), Russia, Brazil, Hungary, Philippines, Tasmania.

Crocus (Saffron; Spanish saffron; French saffron). Stigmas of Crocus sativus.
Habitat: Western Asia, Asia Minor, Egypt, France and Spain.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Coloring; flavoring.
Railroad shipping regulations: None.*

Crocus Antimony. Antimony oxide, brown.

Crocus Martis. Similar to Venetian red (q.v.).

Crocus Martis Adstringens. See Ferric oxide, red.

Crocus, Polishing. See Ferric oxide, red.

Crocus, Red. Similar to Venetian red (q.v.).

Cromfordite. See Phosgenite.

Cronite No. 1.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class A.
Characteristic ingredient: Class Ia.
See Explosives, permissible.
Railroad shipping regulations: High explosive.

Cross Mint. See Crispmint.

Crotal. See Crottle.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Crotaline (Crotalus adamanteus).
A name used in medicine for the venom of the rattlesnake. It has been used with poor results in the treatment of phthisis, asthma, neuralgia and epilepsy.

Crotalus Adamanteus. See Crotaline.

Croton. See Tiglium.

Croton Chloral. Erroneous designation of butyl chloral hydrate.

Croton Oil (Tiglium oil).
Color and properties: Brownish-yellow; poisonous!
Chief constituents: Glycerides of stearic, palmitic, myristic, lauric and oleic acids.
Soluble in ether, chloroform and fixed or volatile oils; slightly soluble in alcohol.
Derivation: By expression from the seeds of Croton tiglium.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: 25 lb. tins; 1, 5, 10 lb. glass bottles.
Uses: Medicine (powerful, drastic purgative).
Railroad shipping regulations: None.*

Crotonaldehyde $CH_3CHCHCHO$.
Color and properties: Water-white mobile, inflammable liquid; pungent, suffocating odor; turns to a pale yellow color in contact with light and air. An effective lachrymator.
Constants: Sp.gr. 0.8567 (15.6°/4°); b.p. 102°C.; flash point 127.4°F.; freezing point −74°C.
Slightly soluble in water; miscible in all proportions with alcohol, ether, benzene, toluene, kerosene, gasoline, solvent naphtha.
Grades: Technical (99%).
Containers: 5, 10, 55, 110 gal. drums.
Uses: Solvent for varnishes, uncured synthetic resins, vegetable and mineral oils, rosin, shellac, wood distillation resin; solvent (on heating) for fats, waxes and rubber.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Crotonic Acid $CH_3CHCHCO_2H$.
Color and properties: Colorless crystals.
Constants: Sp.gr. 0.9730; m.p. 72°C.; b.p. 185°C.
Soluble in water and ligroin.
Derivation: By heating malonic acid with paraldehyde and glacial acetic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Crotonolic Acid. See Tiglic acid.

Crottle (Crotal). Generic term for several species of lichens (q.v.) used for dyeing buff and brown colors. Some of the better known varieties are black crottle, stone crottle, dark crottle, and hazel crottle.

"Crow Brand" Black. See under Blacks.

Crown Bark. See Cinchona bark, Loxa.

Crude Oil. See Petroleum.

Crurin (Quinoline bismuth sulfocyanide) $(C_9H_7NHSCN)_3Bi(SCN)_3$.
Color and properties: Reddish-yellow powder; feeble quinoline odor; commercial product contains 25% active ingredients with starch.
Insoluble in water, alcohol and ether.
Uses: Medicine (antiseptic, ulcers, gonorrhea, unofficial).
Railroad shipping regulations: None.*

Crusher Oil. A compound of 50% summer black oil and 50% 26°Bé. steam-refined cylinder stock is stated by one text book to be suitable for this purpose.
Railroad shipping regulations: None.*

Cryolite (Cryolith; Kryolith; Greenland spar; Ice Stone) Na_3AlF_6 or $3NaF.AlF_3$.
A natural fluoride of sodium and aluminum. Usually colorless to snow-white, but sometimes reddish or brownish or even black. Vitreous, greasy, moist-looking or pearly luster. Varieties:
Greenland—13.23% Al, 32.71% Na, some Mn_2O_3 and MgO, vanadic and phosphoric acids.
Russian—13.41% Al, 32.31% Na, some Fe_2O_3, Mn_2O_3 and CaO.
American—12.9% Al, 32.4% Na, some Fe_2O_3, Ca, H_2O.
Greenland cryolite is the important commercial variety.
Constants: Sp.gr. 2.9 to 3; hardness 2.5.
Occurrence: United States (Colorado), Greenland, Russia.
Uses: Chemicals (sodium salts); aluminum manufacture (flux); glass (opacity).

Cryolith. See Cryolite.

Cryptoclase. See Feldspar.

Cryptolite. See Monazite.

"Cryptone." Trade name for a high zinc sulfide lithopone. It is said to contain a minimum of 50% zinc sulfide.

Cryptopine $C_{21}H_{23}NO_5$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 217°C.
Soluble in chloroform and boiling alcohol; insoluble in water and ether.
Derivation: From opium, by extraction and crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Crystal Ammonia. See Ammonium carbonate.

Crystallizable Acetic Acid. See Acetic acid, glacial.

Crystallized Verdigris. See Copper acetate.

Crystallose. See Sodium benzosulfinide.

Crystals of Venus. See Copper acetate.

Crystolon. Trade mark for a line of silicon-carbide refractory and abrasive products.
Grains. Available in standard mesh sizes. Used as refractory addition in ceramic bodies, saggers, kiln furniture, etc., rammed-in linings, zinc retorts, etc.
Physical characteristics: Sp.gr. 3.2; m.p.: Dissociates 2,250°C. (approximately); specific heat 0.186 gram calories per gram per °C.
Cements. Clay-bonded mixtures, chemically acidic. Very refractory, forming relatively dense bodies. Used for patching furnace linings and tamping shapes.
Refractories. Bonded silicon-carbide shapes are very refractory, have exceptionally high heat conductivity, resist temperature changes well, made in various types of shapes. May be used at temperatures up to 1,750°C. depending upon service conditions. Used for brick for boiler-furnace linings, hearth plates for heat-treating furnaces, crucibles for special work, resistor blocks for lightening arrestors, plates for furnaces.

Cubeb. See Cubeba.

Cubeb Oil.
Color and properties: Colorless, pale greenish or yellowish liquid; characteristic odor of cubebs; warm camphoraceous taste.
Chief known constituents: Sesquiterpenes; cadinene; dipentene.
Constants: Sp.gr. 0.905 to 0.925; b.p. 175° to 280°C.; refractive index 1.49 to 1.496; optical rotation −25° to −40°.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the unripe fruit of Piper cubeba.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Rectification.
Grades: Technical.
Containers: 10 lb. tins; 1, 5 lb. glass bottles.
Uses: Medicine (local irritant).
Railroad shipping regulations: None.*

Cubeb Paste. A mixture of powdered cubebs and copaiba.

Cubeba (Cubeb; Tailed pepper; Java pepper).
Derivation: Dried, unripe, but fully grown fruit of Piper cubeba.
Habitat: Southern Asia (Java, Borneo and Sumatra); cultivated in Ceylon and West Indies.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine, as a local irritant.
Railroad shipping regulations: None.*

Cubebae Fructus (Cucurbitae semina praeparate; Melon pumpkin seeds).
Derivation: Fresh ripe seeds of cultivated plants of Cucurbitae maxima.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Cubebin. A constituent of cubeb. Inodorous crystals soluble in chloroform and hot alcohol. Used in medicine (unofficial).

Cubic Niter. See Caliche.

Cubic Saltpeter. See Caliche.

Cuca. See Coca.

Cucumber Oil (Gourd oil).
Color and properties: Greenish-yellow, fixed, drying oil; faint red fluorescence.
Constants: Sp.gr. 0.923; m.p. —16°C.; saponification value 188.7; iodine number 121.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: From the seeds of the cucumber, pumpkin, etc., by pressing.
Containers: Glass bottles; tins; iron drums.
Grades: Technical.
Uses: Medicine; illumination; fuel; ingredient of toilet preparations, pomades, cosmetics, etc.
Railroad shipping regulations: None.*

Cucurbita. See Pepo.

Cudbear (Persio).
A purplish-red powder prepared from certain lichens (Rocella de candolle, Locanora acharius).
Habitat: Norway, Sweden, European mountains, Mediterranean coast, Madeira, Mozambique, Madagascar, California.
Derivation: By macerating lichens with dilute ammonia and caustic soda, with fermentation.
Grades: N.F.
Uses: For its tinctorial powers.
See also Litmus and Orchil.

Cuenca Bark. See Cinchona bark, Loxa.

Cuite. A term applied to degummed natural silk.

Cullet. Broken glass added to the batch in glass manufacture.

Culvers. See Leptandra.

Cumar. A proprietary brand of para-coumarone resin (q.v.).

Cumaric Anhydride. See Coumarin.

Cumaron Resin. See Para-coumarone.

Cumene (Isopropylbenzene; Isopropylbenzol; Trimethyl benzol; Trimethylbenzene; Cumol) $C_6H_5CH(CH_3)_2$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.8620; b.p. 152.7°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: (a) By the interaction of benzene and isopropyl iodide. (b) By distilling cuminic acid. (c) By the interaction of benzal chloride and zinc methyl.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Sterilizing catgut; organic synthesis; solvent.
Railroad shipping regulations: None.*

Cumidine (Pseudocumidine; 1:2:4-Trimethyl-5-aminobenzene) $C_6H_2(CH_3)_3NH_2$.
Color and properties: White crystals.
Constants: M.p. 62°C.; b.p. 236°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating crude xylidine with methyl alcohol and hydrochloric acid in an autoclave. The pure cumidine is separated from the product by means of its sparingly soluble, crystalline nitrate.
Grades: Technical.
Containers: Wooden barrels.
Uses: Manufacture of dyes; organic synthesis.
Railroad shipping regulations: None.*

Cumin (Cummin).
Derivation: Fruit of Cuminum cyminum.
Habitat: Mediterranean region and northern Africa.
Grades: Technical.
Containers: Boxes.
Uses: Medicine; flavoring.
Railroad shipping regulations: None.*

Cumin Oil.
Color and properties: Colorless or yellowish, limpid liquid; characteristic odor of cumin; sharp, spicy taste.
Chief known constituents: Cumene; cumic aldehyde.
Constants: Sp.gr. 0.900 to 0.930; optical rotation +4 to +8.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the fruit of Cuminum cyminum.
Method of purification: Rectification.
Grades: Technical.
Containers: 25 lb. tins; 1, 5 lb. glass bottles.
Uses: Medicine; flavoring; perfumery.
Railroad shipping regulations: None.*

Cummin. See Cumin.

Cumol. See Cumene.

Cundurango. See Condurango.

Cup Grease. Animal fat saponified with slaked lime and the resulting product sprayed with a light-colored mineral oil is said to make a satisfactory cup grease.

Cupferron (Ammonium-nitroso-beta-phenylhydroxylamine) $C_6H_5NNOONH_4$.
Color and properties: Creamy-white crystals.
Soluble in water, alcohol and ether.
Derivation: By treating an ethereal solution of beta-phenylhydroxylamine with dry ammonia gas and amyl nitrite.
Method of purification: Recrystallization.
Grades: Pure.
Containers: Glass bottles.
Uses: Reagent in analytical chemistry.
Railroad shipping regulations: None.*

Cuprammonium Silk. See Rayon.

Cuprase. A colloidal suspension of hydrated copper oxide developed for experimental treatment of cancer. Unofficial.

Cupreïne $C_{19}H_{22}O_2N_2$.
An alkaloid obtained in conjunction with quinine from cuprea bark (Remijia pedunculata).

Cupren. See Cuprene.

Cuprene (Cupren) $(C_7H_6)_2$.
Color and properties: Yellow substance; a polymerization product of acetylene.
Derivation: By passing acetylene over reduced copper heated above 180°C. until a brown solid

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

is formed. Acetylene is passed over this solid until no further change occurs.
Uses: Constituent of certain explosives.
Railroad shipping regulations: None.*

Cupriaseptol (Copper phenolsulfonate; Copper sulfocarbolate) $[C_6H_4(OH)SO_3]_2Cu.6H_2O$.
Color and properties: Green prismatic crystals.
Soluble in water and alcohol.
Derivation: Interaction of barium phenolsulfonate and copper sulfate.
Uses: Medicine (styptic, hemostatic, antiseptic, also local treatment of gonorrhea, unofficial).
Railroad shipping regulations: None.*

Cupric Chromate, Basic. See Copper chromate.

Cupric Salts. See corresponding copper salts.

Cuprite (Ruby copper ore; Red oxide of copper) Cu_2O.
Crimson, scarlet, vermilion, deep or brownish-red, secondary mineral, adamantine or dull luster, brownish-red streak. Superior in hardness to cinnabar and proustite and differs from them in color of streak. Inferior in hardness to hematite. Contains 88.8% cuprous oxide, 11.2% oxygen. Chalcotrichite (plush copper ore) and tile ore are varieties. Soluble in nitric and concentrated hydrochloric acids.
Constants: Sp.gr. 5.85 to 6.15; hardness 3.5 to 4.
Occurrence: United States (New Jersey, Pennsylvania, Michigan, Arizona, Colorado, New Mexico, Nevada, Wyoming, California), England, Germany, France, Siberia, Australia, Chile, Peru, Bolivia.
Uses: Source of copper.

Cupro-magnesium. An alloy of copper and magnesium.

Cupro-tungsten. An alloy of copper and tungsten.

Cupro-vanadium. An alloy of copper and vanadium possessing great toughness.

Cupro-vanadium-aluminum. An alloy of copper, vanadium and aluminum.

Cuprodescloizite (Tritochorite; Ramirite).
Similar to descloizite (q.v.) but contains from 6.5 to 9% copper.
Occurrence: United States (Arizona), Mexico, East Africa.

Cuprol (Copper nucleinate).
Color and properties: Green powder, containing 6% copper. Is not precipitated by alkalis or albuminous liquids.
Soluble in hot water.
Uses: Medicine (trachoma and maladies of the conjunctiva, unofficial).
Railroad shipping regulations: None.*

Cuproscheelite $(Ca,Cu)WO_4$.
A variety of scheelite (q.v.) forming a transition product to cuprotungstite (q.v.). Contains 6.8% CuO. Green color.
Occurrence: United States (California), Australia, Spain.

Cuprotungstite $CuWO_4$.
Natural tungstate of copper. See also Cuproscheelite.

Cuprous Iodide Cu_2I_2.
Color and properties: White powder.
Constants: Sp.gr. 5.653 at 15°C.; m.p. 628°C.
Soluble in ammonia and potassium iodide solutions; insoluble in water.
Derivation: Interaction of solutions of potassium iodide and copper and iron sulfates.
Uses: Medicine (unofficial).
Railroad shipping regulations: None.*

Cuprous Salts. See corresponding copper salts.

Curacao Aloes. A variety of aloes (q.v.).

Curacao Orange. See Orange peel, bitter.

Curcuma (Turmeric; Curry; Indian saffron).
Rhizome of Curcuma longa.
Habitat: China, East Indies and many tropical countries.
Grades: Technical.
Containers: Burlap bags.
Uses: Coloring foods; condiment (curry powder); textile dyeing; indicator in analytical chemistry.
Railroad shipping regulations: None.*

Curcuma Oil (Turmeric oil).
Essential oil.
Chief known constituents: Turmerol; phellandrene.
Constants: Sp.gr. 0.940 to 0.945.
Derivation: Distilled from the rhizome of Curcuma longa.

Curcumin. A yellow coloring matter obtained from turmeric.

Curled Dock. See Rumex.

Curled Mint. See Crispmint.

Curry. See Curcuma.

Cursite. A proprietary compound used with soda for boiling off cotton and rayon prior to dyeing.

Cuscus Oil. See Vetiver oil.

Cusparia. See Angostura.

Cusso. See Kousso.

Cutch. See Catechu.

Cutting-tool Lubricants. A solution of soft soap and soda in water is stated to be satisfactory for this purpose.
Railroad shipping regulations: None.*

Cuttle Fish Bone. See Sepia (Os sepiae).

Cyanamide. See Calcium cyanamide.

Cyanegg. A proprietary brand of egg-shaped lumps of sodium cyanide.

Cyangran. A proprietary brand of granular sodium cyanide.

Cyanite (Kyanite; Disthene) $(AlO)_2SiO_3$.
A natural silicate of aluminum. Color, blue, gray, white, green or black; uncolored or white streak; vitreous luster.
Constants: Sp.gr. 3.56 to 3.67; hardness 5 to 7.25.
Occurrence: United States (Massachusetts, Connecticut, Vermont, Pennsylvania, Virginia, North Carolina), Switzerland, Austria, Sweden, Brazil.
See also Andalusite, Sillimanite.

Cyan Salt. Made by fusing ferrocyanide with sodium carbonate.

Cyanoacetic Acid $CH_2CNCOOH$.
Color and properties: White crystals.
Constants: M.p. 66.1° to 66.4°C.
Soluble in water, alcohol and ether.
Derivation: By the interaction of sodium chloroacetate and potassium cyanide solution.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Cyanogas. A proprietary brand of calcium cyanide used for fruit-tree dusting and a rodent exterminator, and as a fumigant for greenhouses and other enclosed spaces.

Cyanogen C_2N_2.
Color and properties: Colorless gas; pungent penetrating odor; burns with a purple-tinged flame; extremely poisonous!
Constants: Sp.gr. 1.8064 (compared to air); liquefaction-point 21°C.; solidification-point −34°C.
Soluble in water, alcohol and ether.
Derivation: Potassium cyanide solution is slowly dropped into copper sulfate solution; mercury cyanide is heated.
Grades: Technical; pure.
Containers: Liquefied cyanogen: Iron cylinders.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Organic synthesis; poison gas in warfare.
Fire hazard: Dangerous.*
Railroad shipping regulations: Poison gas.

Cyanogen Chloride $CNCl$.
Color and properties: Colorless liquid; poisonous!
Constants: M.p. —5°C.; b.p. 13°C.
Soluble in water, alcohol and ether.
Derivation: By the action of chlorine on moist sodium cyanide suspended in carbon tetrachloride and kept cooled to —3°C., followed by distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron cylinders.
Uses: Organic synthesis; manufacture of military poison gases.
Railroad shipping regulations: Poison gas.

Cyanogen Iodide. See Iodine cyanide.

Cyanogen Mud. A mud formed in gas purifiers when coal gas is brought into contact with a saturated solution of ferrous sulfate for the removal of cyanogen. It contains about 30% Prussian blue.

Cyanophyl (Cyanophyll). A supposititious blue constituent of chlorophyll.

Cyanophyll. See Cyanophyl.

Cyanuric Acid (Tricarbimide; Isocyanuric acid; Tricyanic acid) $CO(NHCO)_2NH.2H_2O$.
Color and properties: White crystals.
Constants: Sp.gr. 1.768.
Soluble in water, alcohol and hot mineral acids.
Derivation: By heating urea or by the action of water on cyanuric chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Cycline. Trade name for a neutral softening oil.

Cyclobutane. See Naphthenes.

Cycloform (Isobutyl-para-aminobenzoate) $NH_2C_6H_4COOCH_2CH(CH_3)_2$.
Color and properties: White crystalline scales.
Almost insoluble in water.
Uses: Medicine (local anesthetic; dusting powder for ulcers, burns, tuberculous laryngitis; ointment in chronic eczema, other skin diseases, anal fissure, hemorrhoids, unofficial).

Cyclohexanol (Hexalin; Hexahydrophenol). $(CH_2)_5CHOH$.
Color and properties: Colorless; camphor-like odor; hygroscopic.
Constants: Sp.gr. 0.937 (37°/4°); m.p. 23°C.; b.p. 160.9°C.; weight per gal. approximately 8 lbs.
Sparingly soluble in water.
Derivation: Phenol is reduced with hydrogen over active nickel at 160° to 170°F. The cyclohexanone is removed by condensing with benzaldehyde in the presence of alkali.
Grades: Technical.
Containers: 1, 2, 5, 10, 50 gal. drums.
Uses: Soap making to incorporate solvents and phenolic insecticides; rubber solvent; solvent for nitrocellulose; manufacture of celluloid; textile finishing.
Railroad shipping regulations: None.*

Cyclohexanone $(CH_2)_5CO$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.9503 (15.3°/4°); b.p. 156.6° to 156.8°C.; weight per gal. approximately 8 lbs.
Derivation: By passing cyclohexanol over copper with air, at 280° F.; oxidation of cyclohexanol by chromic acid.
Grades: Technical.
Containers: 1, 2, 5, 10, 50 gal. drums.
Uses: Organic syntheses; solvent; textile finishing.
Railroad shipping regulations: None.*

Cyclopentane. See Naphthenes.

Cyclops 17 Metal. A ferrous alloy containing in addition to iron 20% nickel, 8% chromium, 0.75% manganese and 0.4% carbon. It is resistant to very dilute hot and cold sulfuric acid and to cold concentrated sulfuric acid, hot and cold sodium and ammonium hydroxides in all concentrations, and sea and mine waters.

Cyclopropane. See Naphthenes.

Cydonia (Quince seed).
Derivation: Seed of Cydonia vulgaris.
Habitat: Southern Asia and Europe; widely cultivated.
Grades: Technical.
Containers: Bags; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Cylinder Stocks.
Dark green oils used for lubricating steam cylinders. They consist of mineral oils, often compounded with fatty oils (see compounded oils) and contain varying amounts of asphaltic matter depending on the degree of refining and quality of the crude from which derived. One text book cites the following:
Constants of "filtered cylinder stock" from certain eastern refineries:

Gravity °Bé.	Flash point °F.	Fire test °F.	Saybolt viscosity at 212°F.
29	450	500	90
28	500	550	120
27	540	600	140
26¼	550	615	165
27	550	610	150

Constants of five grades of "steam-refined cylinder stock" usually produced from Pennsylvania crudes:

Gravity °Bé	Flash point °F.	Fire test °F.	Cold test °F.	Saybolt viscosity at 212°F.
26	535	600	40	160
25½	545	610	40	168
25	570	635	30	200
24½	590	650	30	225
24½	600	675	30	250

Constants of four grades of "unfiltered stock" from Pennsylvania crudes:

Gravity °Bé.	Flash point °F.	Fire test °F.	Saybolt viscosity at 212°F.
26	540	600	140
25½	585	650	200
25	600	660	230
24	630	700	270

See also Lubricants, United States Government Master Specifications.

Cymene (Cymol; Isopropyltoluene; Isopropyltoluol; Para-cymol; Para-methylpropylbenzene) $CH_3C_6H_4CH_2CH_2CH_3$.
Color and properties: Colorless, transparent liquid; aromatic odor.

Constants:	Ortho-	Meta-	Para-
Specific gravity	0.8748	0.862	0.8551
Melting-point	—182°C.	—25°C.	—73.5°C.
Boiling-point	181°C.	175.6°C.	176.5°C.

Soluble in alcohol, ether and chloroform; insoluble in water.
Derivation: Obtained as a by-product in sulfite digestion of spruce pulp in paper manufacture.
Method of purification: Washing with sulfuric acid, water and alkali.
Grades: Technical.
Containers: Iron drums; glass bottles.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Organic synthesis; solvent; synthetic rubber manufacture; preparation of carvacrol; metal polishes.
Railroad shipping regulations: None.*

Cymogene.
A petroleum product, gaseous at ordinary temperatures but liquefiable by cold or pressure, consisting chiefly of butane (C_4H_{10}). It has also been referred to as rhigolene (q.v.).
Constants: Sp.gr. 0.590 to 0.636; Bé.gr. 90° to 108°; b.p. 0°C.
Uses: Local anesthetic, refrigeration medium.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Cymol. See Cymene.

Cymol, Para-. See Cymene.

Cymophane. See Cat's eye.

Cypress Oil.
Color and properties: Pale yellow liquid; characteristic odor.
Chief known constituents: Pinene, cymene, camphene, furfural, terpineol, cypress camphor.
Constants: B.p. 160° to 250°C.; optical rotation +4 to +31.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the fresh leaves and tender shoots of the cypress tree, Cypressus sempervirens.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine (treatment of whooping cough, unofficial).
Railroad shipping regulations: None.*

Cyprian Earth. See Earths, green.

Cypripedium (Lady's slipper; American valerian; Nerve root; Noah's ark; Yellow moccasin flower).
Dried rhizome and roots of Cypripedium bulbosum or other species of Cypripedium.
Habitat: Nova Scotia south to Alabama and west to Nebraska and Missouri.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (gentle nerve stimulant).
Railroad shipping regulations: None.*

Cyrtolite. A yellowish to brownish mineral containing zirconia, yttria, ceria, and other rare earths. Found in pegmatites. New York, North Carolina and Texas.

Cystamine. See Hexamethylenetetramine.

Cystogen. See Hexamethylenetetramine.

Cystopurin (Hexamethylenetetramine-sodium acetate) $(CH_2)_6N_4 2(CH_3COONa).6H_2O$.
Color and properties: Colorless, lanciform crystals; tasteless.
Soluble in water.
Derivation: Reaction between formaldehyde, ammonia and sodium acetate.
Uses: Medicine (prophylactic, urine antiseptic, cystitis, gonorrhea, unofficial).
Railroad shipping regulations: None.*

Cytisine (Ulexine) $C_{11}H_{14}N_2O$.
Color and properties: Colorless, yellowish-white crystals.
Constants: M.p. 152° to 153°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: By extraction of the seeds of Cytisus laburnum and many other Papilionaceae and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

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Dahlin. See Inulin.

Dahl's Acid. See 2-Naphthylamine-5-sulfonic acid.

Dakin's Oil. Chlorcosane (q.v.).

Damar Gum. See Dammar gum.

Damar Resin. See Dammar gum.

Damiana (Turnera).
Dried leaf of plant, Turnera diffusa or T. aphrodisiaca.
Habitat: Southern California, Mexico, South America, West Indies.
Grades: N.F.
Uses: Medicine (feeble tonic).

Dammar Gum (Damar gum; Damar resin).
Color and properties: Yellowish-white, semitransparent, roundish, friable masses.
Constants: Sp.gr. 1.04 to 1.12; m.p. 120°C.
Soluble in alcohol, ether, chloroform, carbon bisulfide, concentrated sulfuric acid and oil of turpentine.
Derivation: A resinous exudation from Shorea wiesneri.
Habitat: East Indies and Philippines.
Grades: Technical.
Containers: Bags.
Uses: Varnishes; lacquers.
Railroad shipping regulations: None.*

Damson, Bitter. See Simaruba bark.

Danaite. A cobaltous variety of arsenopyrite (q.v.) 4 to 10% cobalt replacing iron.

Dandelion. See Taraxacum.

D'Arcet Metal. See table under Fusible metals.

Datolite. See Zeolites.

Datura.
Derivation: Dried leaves or seeds of Datura fastuosa and other species of Datura.
Grades: Technical.
Containers: Bags.
Uses: Medicine (effect similar to belladonna).
Railroad shipping regulations: None.*

Daturine. See Atropine.

Dchit (Jaft). A tanning material containing about 40% tannin. It is of Persian origin and is stated to be an oak product.

Dead Oil (Heavy oil). The oil, with a density greater than that of water, obtained in the distillation of coal-tar.

Deadly Nightshade. See Belladonna.

Death's Herb. See Belladonna.

Deblooming Agents. Products added to mineral oils to mask fluorescence. Nitronaphthalene and yellow coal-tar dyes are among the products so used.

Decahydronaphthalene (Decalin).
Color and properties: Colorless liquid; aromatic odor.
Constants: Sp.gr. 0.877 at 20°C.; b.p. 189° to 191°C.; refractive index 1.4815; weight per gal. approximately 8 lbs.
Insoluble in water; soluble in alcohol and ether.
Derivation: By treatment of naphthalene in a fused state (above 100°C.) with hydrogen in the presence of a catalyst such as finely divided nickel or copper oxide.
Grades: Technical.
Containers: 1, 2, 5, 10, 50 gal. drums.
Uses: Solvent; substitute for turpentine; cleaning machinery; stain-remover.
Railroad shipping regulations: None.*

Decalin. See Decahydronaphthalene.

Dechenite PbV_2O_6.
Deep-red to yellowish-red or brownish-red mineral. Orange yellow streak.
Constants: Sp.gr. 5.6 to 5.8; hardness 3 to 4.
Occurrence: Germany.

Decocta. U.S.P. term for decoctions, the liquid produced by boiling one or more drugs in water and filtering.

Deep Chrome. See Chrome yellows.

Deerberry. See Gaultheria.

Deer's Tongue. See Liatris.

Defiheat Rustless Iron. A ferrous alloy containing in addition to iron 25 to 30% chromium, less than 0.5% manganese, 0.25% carbon and a trace of nickel. It offers good resistance to hot and cold, dilute and concentrated nitric and acetic acids, sodium and ammonium hydroxides, and mine and sea waters.

Defirust Rustless Iron. A ferrous alloy containing in addition to iron 12 to 14% chromium, less than 0.5% manganese, less than 0.1% carbon and a trace of nickel. It offers good resistance to hot and cold concentrated sulfuric acid and hot and cold, dilute and concentrated, nitric and acetic acids and sodium and ammonium hydroxides.

Defirust Rustless Iron, Special. A ferrous alloy containing in addition to iron 16 to 18% chromium, less than 0.5% manganese, less than 0.1% carbon and a trace of nickel. It is resistant under all conditions to nitric and acetic acids, ammonium and sodium hydroxides, and moist sulfurous atmospheres.

Defistain Rustless Iron. A ferrous alloy containing in addition to iron 17 to 19% chromium, 7 to 10% nickel, less than 0.5% manganese and 0.2% carbon. It offers good resistance in all concentrations to hot and cold nitric and acetic acids and ammonium and sodium hydroxides and also to sea and mine waters and moist sulfurous atmospheres.

Degras (Sod oil; Wool grease).
Color and properties: Dark-brown unctuous fat; disagreeable odor.
Derivation: Crude grease obtained by washing sheep's wool.
Soluble in alcohol, ether and benzene.
Grades: Technical.
Containers: Wooden barrels.
Uses: Leather stuffing; belt-dressing compound; producing lanolin; printing inks; special soaps; varnishes.
Railroad shipping regulations: None.*

Degras, Moellon.
Derivation: A by-product of the tannage of chamois leathers by impregnation with cod or menhaden fish oils. An oxidation of a part of the fatty acids of the oils takes place. When the tannage is complete, the excess of the oil contained in the skins is pressed out. This,

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

when compounded, forms the moellon degras of commerce.
Grades: Anhydrous; 20% water; 30% water; 35% water.
Containers: Wooden barrels.
Uses: Stuffing leathers; belt dressing.
Railroad shipping regulations: None.*

Degomma. Proprietary name for a diastatic preparation of animal origin containing large amounts of proteolytic and lipolytic enzymes.
Color and properties: Creamy powder with a faint meaty odor; optimum activity at pH 7.0 (range from pH 4.0 to pH 10.0) at 40°C.
Soluble in water.
Derivation: The pressed juice from pancreatic glands is precipitated by the addition of neutral salts; the enzyme is filtered, dried and mixed with a carrier such as common salt or sodium sulfate.
Uses: Textile industry to remove starch from fabric and in sizing pastes.
Railroad shipping regulations: None.*

Dehydrothio-para-toluidine (Amino-benzenyl-ortho-aminothiocresol) $C_7H_6NSCC_6H_4(NH_2)$.
Color and properties: Long, yellowish, iridescent needles. Solutions have a violet-blue fluorescense.
Constants: M.p. 191°C.; b.p. 434°C.
Soluble in alcohol; very slightly soluble in water.
Derivation: By heating para-toluidine and primuline base with sulfur and separation from the primuline base by distillation in vacuo.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyestuffs.
Railroad shipping regulations: None.*

Dehydrothioxylidine (Aminotoluenyl-ortho-aminothioxylenol) $C_6H_2(CH_3)_2NSCC_6H_3(CH_3)NH_2$.
Color and properties: Yellowish-white prisms.
Constants: M.p. 107°C.; b.p. 283°C.
Soluble in hot alcohol; insoluble in water.
Derivation: By heating meta-xylidine with sulfur. The product is distilled in vacuo and separated from the isohydrothioxylidine formed by extraction with hydrochloric acid.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyestuffs.
Railroad shipping regulations: None.*

Delhi Hard. A ferrous alloy containing in addition to iron 16.5 to 18% chromium, 1 to 1.1% carbon, 0.75 to 1% silicon, 0.35 to 0.5% manganese. It is resistant to cold ammonium hydroxide in all concentrations, and to mine and sea waters and moist sulfurous atmospheres.

Delphinine $C_{22}H_{35}NO_6$.
Color and properties: White, crystalline alkaloid; poisonous!
Constants: M.p. 119°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By extraction from the seeds of Delphinium staphisagria.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Delphinium (Staphisagria; Larkspur).
Derivation: Ripe seed of Delphinium ajacis.
Habitat: Mediterranean basin; cultivated in France and Italy.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Local application to destroy lice in hair.
Railroad shipping regulations: None.*

Delta Acid. See 2-Naphthylamine-7-sulfonic acid.

Deltaform. See Bismuth dithiosalicylate.

Denaturants for Alcohol.
The United States Government specifications for the denaturants permitted for use in the formulas for denatured alcohols (q.v.) are listed below.

Aldehol—Grade A (or compounds similar thereto). A product of the oxidation of kerosene having the following characteristics.
Specific gravity: Not over 0.825 at 60°F.
Distillation range: When 100 cc. are subjected to distillation in the same manner and apparatus specified for determining the boiling point of methanol, not less than 20 cc. will distil over under 200°C., and not less than 95 cc. will distill over under 290°C.
Behavior with Schiff's reagent (aldehydes): 10 cc. of the liquid with 15 cc. of Schiff's reagent must show decided violet color within 30 seconds after addition and agitation.
Solubility in 90% ethyl alcohol: When 10 cc. of the liquid is placed in a stoppered cylinder, graduated to one-tenth of a cc., an equal quantity of 90% ethyl alcohol added and the contents shaken and allowed to stand, the alcohol layer will measure not less than 12 cc.
Iodine number: The iodine number shall be not less than 35.
The sample submitted for approval shall have the characteristic odor and color of the standard sample sent to the authorized chemist.

Aldehydes, Formula 6-A. The condensed liquid from the process must contain not less than .4 grams per 100 cc. of mixed aldehydes calculated as acetic aldehyde.

Aniline Oil. The aniline oil is to contain not less than 95% pure aniline (straw or reddish color) of sp.gr. 1.026 at 15°C.; b.p. 181°C.

Animal Oil (Dipples). The animal oil must conform to the following specifications:
Color: The color shall be a deep brown.
Boiling-point: When 100 cc. of the animal oil is subjected to distillation in the same manner as prescribed for the determination of the boiling-point of wood alcohol, not more than 5 cc. should distil over below 90°C.
Pyrrole reaction: 2.5 cc. of a 1% solution of the animal oil in 90% alcohol by volume is diluted to 100 cc. with alcohol. A splinter of pine wood, previously moistened with concentrated hydrochloric acid, is dipped into 10 cc. of this solution containing 0.025% animal oil. After a few minutes the splinter should show a distinct red coloration.
Reaction with mercuric chloride: 5 cc. of the 1% solution of the animal oil in 90% alcohol by volume, when treated with 5 cc. of a 2% solution of mercuric chloride in alcohol, should give an immediate turbidity followed by the separation of a flocculent precipitate after several minutes' standing. Five cc. of the 0.025% solution of animal oil, when treated with 5 cc. of the 2% solution of mercuric chloride, should show a faint turbidity after several minutes.

Benzine. The benzine submitted for approval must be a hydrocarbon product derived from petroleum of a sp.gr. not less than 0.800. It must be of such character as to impart a decided odor to ethyl alcohol when mixed with it in proportion of 0.5% by volume.

Benzene. The benzene submitted shall conform to the following specifications:
Solubility in water: When 10 cc. of benzene is shaken with an equal volume of water in a glass-stoppered cylinder, divided into tenths of a cc. and allowed to stand five minutes to separate, the upper layer of liquid must measure not less than 9.5 cc.
Boiling point (Formula 2-A): When 100 cc. of benzene is subjected to distillation in the

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

same manner as described for the determination of the boiling point of wood alcohol, not more than 1 cc. should go over at 77°C., and not less than 90 cc. at 100°C.

Boiling-point (Formula 2-B): When 100 cc. of benzene is subjected to distillation in the same manner as described for the determination of the boiling-point of wood alcohol, not more than 1 cc. should go over at 77°C., and not less than 95 cc. at 85°C.

Brucine Sulfate. The brucine sulfate $(C_{23}H_{26}N_2O_4)_2H_2SO_4.7H_2O$ (Henry) dimethoxystrychnine used must comply with the following specifications:

Physical properties: Small, white needle-shaped crystals; m.p. 168° to 176°C.; odorless, taste very bitter. (Caution: Use extreme care in tasting the brucine sulfate.)

(Note.—Brucine sulfate sometimes appears in prismatic crystals which are not easily dissolved in alcohol.)

Qualitative identification: A 10% solution of barium chloride added to a solution of brucine sulfate produces a white precipitate insoluble in hydrochloric acid.

Nitric acid: Stannous chloride tests: Concentrated nitric acid dissolves brucine and its salts with a blood-red color. Add a few drops of freshly prepared dilute stannous chloride solution to the reddish solution produced by the nitric acid. An intense violet color will appear (distinction from morphine).

Purity: When dried to constant weight at 110°C. the brucine sulfate should lose not more than 12% of its original weight. The brucine sulfate shall be free from strychnine when tested by the following method: Dissolve 0.3 gram of brucine sulfate in 15 cc. of 3% sulfuric acid solution (warm if necessary). Cool solution and add 3 cc. of a cooled mixture of equal volumes of nitric acid (sp.gr. 1.42) and distilled water. After rotating the liquid a few times set aside for exactly ten minutes, shaking gently three times during the interval. The temperature of the solution should be kept below 25°C. during this operation. The resulting red solution should be transferred immediately to a separatory funnel containing 25 cc. of an aqueous solution of 10% sodium hydroxide. The contents of the separatory funnel should be cooled to below 25°C. The solution in the separatory funnel must be alkaline. Extract with three successive portions of chloroform of 20 cc., 10 cc., and 10 cc., respectively. Draw off the chloroform through a wetted cotton filter into a white porcelain evaporating dish. Evaporate the combined chloroform extractions to dryness on the water bath, being careful to avoid decrepitation. To the residue add a small crystal of potassium bichromate and approximately 2 cc. of concentrated sulfuric acid. If strychnine is present the characteristic violet color will appear.

(Note.—If the brucine contains as much as 0.05% strychnine a clear, distinctive violet color, characteristic of strychnine, will be obtained.)

Butyl Alcohol (Butanol). The normal butyl alcohol must comply with the following specifications:

Color: Colorless.

Acidity: To be less than 0.03% determined as acetic acid.

Dryness: One vol. to mix without clouding with 19 vols. of pure coal-tar benzene.

Specific gravity: To be 0.810 to 0.815 at 20.0°C.

Commercially Pure Wood Alcohol. Specific gravity: Must have a sp.gr. of not more than 0.810 at 60°/60°F.

Diethylphthalate $C_6H_4(CO_2C_2H_5)_2$. Diethylphthalate is colorless, practically without odor, and is miscible with alcohol; b.p. 290° to 297°C. The ester content should be not less than 99%, determined by the usual saponification method.

Qualitative test for diethylphthalate: To 10 cc. of 39-B or 10 cc. of an alcoholic solution of diethylphthalate add 1 cc. of a 10% NaOH solution and evaporate to dryness on a steam bath. To the dry residue add 5 cc. of concentrated sulfuric acid and warm for several minutes on bath. Now add 25 mg. of resorcinol and again heat for several minutes. Transfer the liquid to a test tube and heat to 160°C. for 5 minutes, using paraffin bath. When cool, pour into 200 cc. of water and make alkaline when the characteristic yellow-green fluorescence is at once apparent and indicative of phthalic acid.

For small quantities of diethylphthalate proceed as follows: To 50 cc. of the liquid sample in a porcelain dish or casserole is added 0.2 cc. of 10% sodium hydroxide and evaporated to dryness on a steam bath. If necessary the residue may be heated in an electric oven at 125°C. to obtain absolute dryness.

To this residue is added 5 cc. of concentrated sulfuric acid and the whole warmed on the steam bath for several minutes. Not more than 25 to 40 mg. of resorcinol are now added, and the mixture again warmed until solution is effected. Transfer this to a clean test tube and immerse in a paraffin bath at 160° to 170°C. for 10 minutes. Pour the cooled melt into 150 cc. of water and make alkaline with 10% sodium hydroxide. If diethylphthalate were present in the sample, the characteristic greenish-yellow fluorescence of fluorescein is at once apparent, when viewed against a black background.

In laboratories where a great many preparations containing diethylphthalate are examined it is extremely necessary that all precautions be taken to use absolutely clean apparatus. It is the practice to heat all porcelain ware to redness before running the test. All test tubes used are new or are thoroughly washed with soap powder and rinsed out several times with 95% grain alcohol. A blank test should be run to insure proper interpretation of results.

In all cases where a slight but decided fluorescence is obtained the solution should be allowed to stand for several days to observe any fading. Twenty-four hours should be allowed in every test to allow any pseudo-fluorescence to disappear.

Erythrosin. The erythrosin used in the above formula will be that described as No. 517 in A. G. Green's edition of the "Schultz-Julius Systematic Survey of the Organic Coloring Matters," published in 1904.

Fusel Oil, Refined (Amyl Alcohol).

Color: Colorless.

Acidity: To be less than 0.03% determined as acetic acid.

Specific gravity: To be 0.810 to 0.840 at 15.56°C.

Distillation range: Initial boiling-point 90°C.; end point 140°C., with not over 50% coming over below 125°C.

Solubility: Not over 10% soluble in a saturated salt solution when tested in the manner set forth in Article 31, Regulations No. 3.

Gasoline (Motor Gasoline).

Color: Not darker than No. 16 Saybolt.

Corrosion test: A clean copper strip shall not be discolored when submerged in the gasoline for 3 hours at 122°F.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Distillation range: When the first drop falls from the end of the condenser, the thermometer shall not read more than 55°C. (131°F.). When 20% has been recovered in the receiver, the thermometer shall not read more than 105°C. (221°F.). When 50% has been recovered in the receiver, the thermometer shall not read more than 140°C. (284°F.). When 90% has been recovered in the receiver, the thermometer shall not read more than 200°C. (392°F.). The end point shall not be higher than 225°C. (437°F.). At least 95% shall be recovered as distillate in the receiver from the distillation.

Sulfur: Shall not be over 0.10%.

This specification covers the grade of gasoline used by the United States Government and its agencies as a fuel for automobile, truck, tractor, motor boat, and similar engines; and is known as United States Government Motor Gasoline.

Aviation Gasoline. Volatility and distillation range: When 5% of the sample has been recovered in the graduated receiver, the thermometer shall not read more than 65°C. (149°F.) nor less than 50°C. (122°F.). When 50% has been recovered in the receiver, the thermometer shall not read more than 95°C. (203°F.).

The distillation test above outlined shall be made in the apparatus and in the manner described in Navy Department Specifications 7G1, dated October 2, 1922, particularly referring to Grade A, fighting aviation gasoline.

Isopropyl Alcohol. The isopropyl or secondary propyl alcohol used must comply with the following specifications: The specific gravity of the isopropyl alcohol shall not be more than 0.8224 (60°/60°F.).

Methods for identifying isopropyl alcohol: The methods used for the identification of isopropyl alcohol are the Denige's or presumptive method and the oxidation method. Positive reaction to the Denige's test shows the presence of isopropyl alcohol, but a negative reaction does not necessarily show the absence of isopropyl alcohol.

Procedure: Place 2 cc. of Denige's reagent in a test tube and add 5 drops of the solution of liquid to be tested. The mixture is then heated just to boiling and then removed from the flame. If isopropyl alcohol is present a yellow precipitate will be formed. Solutions containing as low as 0.13% of isopropyl alcohol when tested by the above method will cause the mixture to become turbid and have a very pale yellow color. Denige's reagent is prepared by dissolving 50 grams of mercuric oxide in a mixture of 200 cc. concentrated H_2SO_4 and 1,000 cc. of water.

Oxidation method: Place 8 grams of chromic anhydride (CrO_3) in a Kohlrausch flask of about 100 cc. capacity or some other suitable flask and add 15 cc. of water and about 2 cc. concentrated H_2SO_4. Connect flask with a reflux condenser and add *very slowly* through the condenser 5 cc. of the alcohol to be tested. The reaction is very vigorous and causes the solution to boil. Continue boiling under the reflux condenser for about one-half hour; cool and distill, without transferring the liquid, until 2 cc. has been collected, using a 10 cc. graduated cylinder as a receiver. Mix the distillate and test for acetone in the usual way with Denige's reagent, that is, to 2 cc. of Denige's reagent add 4 or 5 drops, not more, of the distillate and bring to a boil, keeping the solution at just about the boiling temperature about one minute or slightly longer. A fine white precipitate that does not settle very rapidly is indicative of acetone. (Compare reaction by making a 0.5% solution of acetone in ethyl alcohol and test the mixture with Denige's reagent.) Any precipitate formed after heating 2 minutes and allowed to cool should be disregarded. Sometimes in the absence of acetone a precipitate is formed after the solution has been heated for approximately 2 minutes and allowed to cool. It has been general experience that upon heating again to the boiling point nearly all of the precipitate dissolves. Acetaldehyde, paraldehyde, ethyl acetate, acetic acid and mixtures of these do not interfere.

Methanol. See Wood alcohol.

Petroleum Naphtha. The naphtha must have a sp.gr. of not less than 0.650 nor more than 0.720 (60°/60°F.).

Pine Oil. The pine oil (steam distilled) submitted shall conform to the following specifications:

It shall be light yellow pine oil produced by a steam distillation and shall be of sp.gr. not greater than 0.95 at 60°F. It shall be of such nature as to impart a decided pungent odor and a burning taste to the completely denatured alcohol.

Pyridine Bases. Reaction with cadmium chloride: Ten cc. of a solution of 1 cc. of pyridine bases in 100 cc. of water is treated with 5 cc. of a 5% water solution of anhydrous fused cadmium chloride, and the mixture vigorously shaken. Within 10 minutes an abundant crystalline separation should take place.

Behavior with Nessler's reagent: With 5 cc. of Nessler's reagent, 10 cc. of the same solution of pyridine bases must give a white precipitate.

Boiling point: When 100 cc. is subjected to the determination of the boiling point in the same manner as prescribed for wood alcohol, at least 50 cc. must distill at 140°C. and at least 90 cc. at 160°C.

Miscibility with water: The same requirements must be met as are imposed upon wood alcohol. (See same.)

Content of water: When 20 cc. of pyridine bases is shaken with 20 cc. of a solution of caustic soda with a sp.gr. of 1.40, and the mixture allowed to stand for some time, at least 18.5 cc. of the pyridine bases must separate from the solution.

Alkalinity: One cc. of pyridine bases dissolved in 10 cc. of water is titrated with normal sulfuric acid until a drop of the mixture placed upon Congo paper shows a distinct blue border which soon disappears. It must require not less than 9.5 cc. of the acid solution to produce the reaction. The Congo paper is prepared by treating filter paper with a solution of 1 gram of Congo red in 1 liter of water, and drying it.

Sulfuric Acid. Sp.gr. not less than 1.83 at 60°F.

Sulfuric Ether. Sp.gr. not more than 0.728 at 60°F.

Tetrachloroethane. The tetrachloroethane authorized to be used in this Formula is the substance acetylene tetrachloride, commonly known as tetrachloroethane having a b.p. of approximately 147°C.

Tobacco Denaturant. The tobacco denaturant must conform to the following analytical requirements:

Determination of nicotine: It must contain not less than 1.88% of nicotine when tested by the following process: 20 cc. of the solution is measured into a 500 cc. Kjeldahl flask provided with a suitable bulb tube, 10 cc. of 0.1N alkali added, the liquid made up to 50 cc., and distilled in a current of steam until the distillate is no longer alkaline

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

(about 500 cc.). The distillate is then titrated with 0.1N H_2SO_4, using rosolic acid or methyl red as an indicator. Not less than 25.2 cc. should be required for the neutralization.

To determine the intensity of color: Of the denaturing solutions 1 cc. is diluted with 100 cc. of water and 50 cc. of this solution is compared in a 50 cc. Nessler tube with 50 cc. of a solution containing 5 grams of $CuSO_4 . 5H_2O$, C.P., in 100 cc. of water.

Wood Alcohol. The wood alcohol submitted must be a partially purified continuous distillate from crude wood alcohol obtained only by the destructive distillation of wood. A mere physical mixture of the essential chemical constituents will not be approved. Every shipment of such wood alcohol submitted to the authorized chemist for examination and report must be accompanied by a sworn statement from the manufacturer thereof giving the name and address of the refinery in the United States where produced and certifying that it is a partially purified continuous distillate of wood origin. This denaturant must conform to the following analytical requirements:

Color: This shall not be darker than that produced by a freshly prepared solution of 2 cc. of 0.1N iodine diluted to 1,000 cc. with distilled water.

Specific gravity: Not more than 0.830 at 60°F. (15.56°C.) corresponding to 91° of Tralles' scale.

Boiling point: 100 cc. slowly heated in a flask under conditions as described below must give a distillate of not less than 90 cc. at a temperature not exceeding 75°C. at the normal pressure of the barometer (760 mm.). One hundred cc. of wood spirit is run into a short-necked copper flask of about 180 to 200 cc. capacity and the flask placed on an asbestos plate having a circular opening of 30 mm. diameter. In the neck of this flask is fitted a fractionating tube 12 mm. wide and 170 mm. long, with a bulb just 1 cm. below the side tube, which is connected with a Liebig condenser having a water jacket not less than 400 mm. long. In the upper opening of the fractionating tube is placed a standardized thermometer, so adjusted that its mercury bulb comes in the center of the bulb. The distillation is conducted in such a manner that 5 cc. pass over in one minute. The distillate is run into a graduated cylinder, and when the temperature of 75°C. has been reached at the normal barometric pressure of 760 mm. at least 90 cc. shall have been collected. Should the barometer vary from 760 mm. during distillation, 1°C. shall be allowed for every variation of 30 mm. For example, at 770 mm., 90 cc. should have distilled at 75.3°C., and at 750 mm., 90 cc. should have distilled at 74.7°C.

Miscibility with water: It must give a clear or only slightly opalescent solution when mixed with twice its volume of water.

Acetone content: It must contain not more than 20 nor less than 10 grams per 100 cc. of acetone and other substances estimated as acetone when tested by the following method (Messinger): One cc. of a mixture of 10 cc. wood alcohol with 90 cc. of water is treated with 10 cc. of double normal soda solution. Then 50 cc. of 0.1N iodine solution is added while shaking, and the mixture made acid with dilute sulfuric acid three minutes after the addition of the iodine. The excess of iodine is titrated back with 0.1N sodium thiosulfate solution; using a few drops of starch solution for an indicator. From 10.3 to 20.7 cc. of 0.1N iodine solution should be used by the spirit. The solution should be kept at a temperature between 15°C. and 20°C.

Calculation:

X = grams of acetone in 100 cc. of spirit.

Y = number of cc. of 0.1N iodine solution required.

N = volume of spirit taken for titration.

Then $X = \dfrac{Y \times 0.096672.}{N}$

Optional method for acetone: Take 10 cc. of wood alcohol, dilute to 500 cc. with water in a 500 cc. graduated glass-stoppered flask; thoroughly mix. Take 5 cc. of this mixture, using a standardized pipette (proceed as usual).

It is recommended that whichever method is used the authorized chemist carry a blank test made up of a solution of pure acetone in methyl alcohol in the proportion of about 16 grams of acetone made up to 100 cc., and when each determination is made a blank be run; then add to the amount of acetone found in the sample under examination the difference between the known value of the blank and the titrated blank.

Esters: It should contain not more than 5 grams of esters per 100 cc. of spirit calculated as methyl acetate and determined as follows: Ten cc. of wood alcohol is diluted to 500 cc. with water in 500 cc. graduated glass-stoppered flask; thoroughly mix; 100 cc. of this mixture is run into a flask and 50 cc. deci-normal sodium hydrate, free from carbonates, is added and the flask connected with a reflux condenser and boiled for one hour. Instead of digesting at boiling temperature the flasks may be allowed to stand over night at room temperature and then heated on a steam bath for 30 minutes with an ordinary tube condenser. The liquid after digestion is cooled and titrated with normal sulfuric acid, using phenolphthalein as an indicator.

Methyl acetate = grams per 100 cc. of spirit

$$= \frac{0.0074 \times \text{cc. of 0.1N soda required} \times 100}{\text{2 cc. spirit taken}}$$

Bromine absorption: It must contain a sufficient quantity of impurities derived from the wood so that not more than 25 cc. nor less than 15 cc. shall be required to decolorize a standard solution containing 0.5 gram of bromine, as follows:

The standard bromine solution is made by dissolving 12.406 grams of potassium bromide and 3.481 grams of potassium bromate (which is of tested purity and has been dried for two hours at 100°C.) in a liter of water. Fifty cc. of the standard solution containing 0.5 gram of bromine is placed in a glass-stoppered flask having a capacity of about 200 cc. This is acidified by the addition of 10 cc. of diluted sulfuric acid (1 to 4) and the whole shaken and allowed to stand a few minutes. The wood alcohol is then allowed to flow slowly into the mixture, drop by drop, rate of flow not to exceed 5 cc. per minute from a burette until the color is entirely discharged. The temperature of the mixture should be 20°C.

In addition* to the above requirements the wood alcohol must be of such character as to render the ethyl alcohol with which it is mixed unfit for use as a beverage.

Denatured Alcohol.

Completely Denatured Alcohol: Ethyl alcohol which has been rendered entirely unfit for beverage use by the addition of denaturants prescribed by the Federal Prohibition Bureau. Such alcohol may be used by the manufacturer or general public without filing bond or obtaining permit. Completely denatured alcohol is not subject to tax by the Internal Revenue Bureau.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Formulas for Completely Denatured Alcohol:

Formula No. 1: 100 parts by vol. ethyl alcohol, 10 parts by vol. approved wood alcohol, 0.5 part by vol. approved benzine.

Formula No. 1 (Modified): 100 parts by vol. ethyl alcohol, not less than 160° alcohol, 10 parts by vol. approved wood alcohol, 0.5 parts by vol. approved gasoline (aviation grade). (This formula, completely denatured No. 1, containing aviation gasoline, is now being used extensively as a substitute in place of specially denatured alcohol, Formula No. 1.)

Formula No. 5: 100 parts by vol. ethyl alcohol, not less than 160° proof, 4 parts by vol. approved methanol (denaturing grade), 0.75 parts by vol. of the compound or one similar thereto known as aldehol grade A, 0.5 part by vol. approved benzine (kerosene).

(Specifications for approved denaturants will be found under Denaturants for Alcohol.)

Uses: While completely denatured alcohol may be used for many purposes, there are some cases where its use should not be attempted. Alcohol so denatured can not safely be used as a bathing or massage alcohol or in other preparations for use on the body. In manufacturing processes it should not be used where the quality of the product is an important factor. Regulations provide that the denaturants used shall be crude or partially refined products. Formula No. 5 is recommended for use as an anti-freeze for automobile radiators. Formula No. 1 is less desirable for the purpose.

The following are a few of the general uses of completely denatured alcohol: Alcohol lamps, annealing and cleaning jewelry, anti-freezing solutions for automobile radiators, blended fuels, bronzing fluids, carbon remover, cartridges, cements, chafing dishes, cleaning fabrics, cleaning and polishing brass, glass, silver, shoes, etc., dipping fluids, disinfectants, dyes, stains, enamels, engine cleaning, etching, for scientific purposes, fumigating lamps, gas mantles, hats, inks, insect powders, lacquers, motor power, oil refining, paints, paint and varnish, preparing subjects for exhibition purposes, shoe blacking, etc., soap, solidified alcohol, soldering flux, starch, starting gasoline lamps, tanning, testing fruit, varnishes, varnish removers, waterproofing compounds, window cleanser.

Containers: Tank cars, 8,000 gals.; steel drums, 53 gals.; wooden barrels, 50 gals.; wooden half barrels, 25 gals.; cases of ten one-gallon cans (Formula 5-188 proof only).

Specially Denatured Alcohol: Specially denatured alcohol is ethyl alcohol so treated with denaturants as to permit of its use in a greater number of specialized arts and industries than completely denatured alcohol. The character of the denaturant or denaturants is such that it may be sold, possessed, and used only pursuant to permit and bond except as otherwise provided in Government regulations of prohibition.

The use of specially denatured alcohol is encouraged by the Bureau for manufacturing processes wherever possible. Alcohol 190 proof (95%), 192 proof (96%), or absolute (99-100%) may be denatured. Such alcohol is not subject to tax, but may be used only under permit and bond.

The numbers appearing in parentheses under "Uses" indicate other formulas which may be used for the specific material immediately preceding the parenthetical number.

Formula No. 1: To 100 gals. of ethyl alcohol add 5 gal. approved wood alcohol.

Uses: Acetaldehyde, acetanilide, acetic ether, acetphenetidine, aconite, adeps lanae, aletrin, alkaloids and alkaloidal salts (39-A), aloin, ammunition, antipyrine, apocynin, arbutin, arsphenamine, artificial flowers and feathers, asclepiadin, aspirin (acetyl salicylic acid), atophan, avenin, analytical work, arabinose, barometer and thermometer tubes, benzaldehyde, benzidine, benzoic acid, benzoin, benzol cyanide, beta-naphthol, beta-naphthol benzoate (3-A), beta-naphthol salicylate composition billiard and pocket balls, bluing (laundry), bottle caps, brushes, benzoin, benzene, camphor (synthetic), celluloid scrap (reworking), cements, chelonin, chloral hydrate (6-B), chloroform, cimicifugin, cinchophen, citronellol, cocoa butter, collodion, collodion corn remedy, colors and bronze powders, compasses, concentrations (nonliquid), coumarin, creosote carbonate, cutlery, caustic potash, confectioners' colors, dandelion, dental alloy, deodorants and substances of a similar nature, diethylaniline, digestive ferments, digitalis, dimethylglyoxime, dinitrotoluene, disinfectant, germicide, door checks, dyes, dextrin, dextrose, embalming fluid, enamel, eosine, essential oil, orris, ether, ethyl acetate, ethyl aniline, ethyl benzoate, ethyl levulinate, ethyl bromide, ethyl butyrate, ethyl chloride, ethyl propionate, extracting glycerol from distillery slop, felt-base floor covering, fertilizers, filaments for incandescent lamps, formaldazone, formaldehyde, fireworks, foot powder, formic ether, fulminate of mercury, fungicides, gaduol, gallocyanine, gas mantles, gentian (solid extract), geraniol, glue, glycerophosphates (3-A), guaiacol, guaiacol carbonate, gelatin capsules, gum and pyroxyline solutions, galactose, glass, glass enamel, hats, heliotropin, hexachlorobenzene, hydrastis (alkaloid of), imitation ivory goods, imitation leather (12-A), incense, inks, insulin, inulin, iriscin, isinglass, insecticides, jalapin (nonliquid concentrations of), japans, jewelry, lacquers, lacquer thinners and solvents, leather goods finish, leather substitutes, liquor cresolis compositus, levulose, lysol, mandrake (powdered and solid extract of), mica insulators, mirrors, moldings and picture frames, monobromated camphor, moth repellant, motor fuel (28), mucilage, maltose, mannose, mannite, metol, melibiose, nitrocellulose (solution and solvent of) (19), nitroso-beta-naphthol, nonshatterable glass, oils, greases, lubricants and soluble thread-cutting oils, oleoresins, ortho-tolylsulfamine, optical goods, paints, paper testing compound, paraffin, paste, pastes and varnishes from soluble cotton (2-A), pepsin and similar products, phenolphthalein, phenylcinchoninic acid (3-A), photographic engravings (5) (11) (19), photographic dry plates (30), photographic films (19), phytolacin (concentration of), podophyllin resin and similar products, polish preparations for metals and furniture, postal-card colors, potassium hydroxide, powder compact, powdered drugs and extracts, print paper and enlargements, pyroxylin cements, paramidophenol pencils, paper, pipe cleaning preparation, plumbing material, potassium cyanate, refining mineral oils, refining precious metals, resin of scammony, resorcinol, raffinose, recrystallization and purification purposes, resins, rhamnose, rhodinol, rouge compact, saccharin, salicylic acid, salicylic aldehyde, salol (3-A), salophen, santonin and strychnine, saponin, shampoo jelly, shampoo liquid, shellac thinner, shellac varnish, shoe polish, silk fabrics, silverware and bronze, smokeless powder (12-A), soap liquid (3-B) (27), soap transparent (3-A), sodium benzoate, soldering flux, solid extracts, solidified alcohol, stains, stencil paper, stencil inks,

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Specially Denatured Alcohol (cont.) sterilizing solution for corks, sulfonic acid, surgical ligatures, synthetic mustard oil, saccharose, sorbit, solution and solvent of nitrocellulose, stanolind, synthetic perfume bases, tannic acid, terpin hydrate (12-A), textile cleansing soap, theobromine, thermostatic devices, tinfoil, toluidine, transparent paper, transparent soap for waterproofing cement, trinitrotoluene, tobacco, trehalose, trioxyaline, tuberculin purified, uric acid, varnish remover, viburnum (concentration), vegetable colors, washing lenses, wax (prepared), water colors, watches, wood filler, wood finish, wool fat, waterproof fiber signs, xylose.

Formula No. 2-A: To 100 gals. of ethyl alcohol add 2 gals. approved wood alcohol, 2 gals. benzene.

Uses: Carbon remover, celluloid, pyralin, and similar products, ethyl acetate, sodium hydrosulfate, japans, varnishes.

Formula No. 2-B: To 100 gals. of ethyl alcohol add ½ gal. benzene. (For use only in closed and continuous process.)

Uses: Acetic ether, acetphenetidine (conditional), arsphenamine, beta-naphthol, centralites, dehydration of nitrocellulose, dyes, diethyl barbituric acid (barbital), diaminophenol, diethylphthalate, dimethylsulfate, ethyl esters of—cinnamic, lauric, benzoic, and pelargonic acids, ethyl acetate, ethyl chloride, ethyl lactate, ethylene, ethyl palmitate, ethyl sulfate, ethyl sulfate (for use in manufacture of acetphenetidine), fulminate of mercury, guaiacol, hydroquinone, Michler's ketone, laboratory experiments, leather dressing, manufacture pectin (closed process), manufacture cement, metol, motor fuel, neoarsphenamine, nitrous ether, phenacetine, pyroxylin plastics, paramidophenol, phenylacetic acid, picric acid test for United States Government, potassium sodium xanthate, powdered chemicals, sulfuric ether in connection with the production of powder, synthetic camphor, saccharin, smokeless powder, sodium hyposulfite, trinitrotoluene, viscoloid, white petroleum oils.

Formula No. 3-A: To 100 gals of ethyl alcohol add 5 gals. commercially pure methyl alcohol.

Uses: Adalin, alkaloids, acetanilide, acid salicylic, acetphenetidine, ammonium, beta-naphthol, by-products from distillery slop, benzonaphthol, beta-naphthol benzoate, brown mixture tablets, bleaching, washing feathers, cinchona bark alkaloid and preparations, codeine, compasses, repairing of same, cutting oils, diacetyl-morphine, deodorants, embalming fluid, ethyl chloride, ethyl morphine, experimental purposes, esters (process of manufacture must accompany application), ethyl acetate, films, glycerophosphates, gradometers, homatropin, lanasol, liquid glue, mercuric chloride tablets (provided no alcohol remains in the finished tablets), morphine, mosquito spray, phenylcinchoninic acid, photographic emulsions, photographic films, resilvering mirrors, salicylate cocaine, senna (extract of), sodium, strontium, salol (see also special formula 1) chemicals, sajodin, shampoo, shampoo jelly, strychnine alkaloids and preparations, synthetic mustard oil, solution of aniline dyes for industrial purposes (except certified food colors), tincture of benzoin soap, transparent soap, veronal, wires, removing insulation from same.

Formula No. 3-B: To 100 gals. of ethyl alcohol add 1 gal. pine tar. (Pix Liquida U.S.P.)

Uses: Liquid soap, shampoo, shampoo jelly, smelling salts, toilet preparations.

Formula No. 4: To 100 gals. of ethyl alcohol add 1 gal. of the following solution: 5 gals. of an aqueous solution containing 40% nicotine; 3.6 ozs. methylene blue. (Water to make 100 gals.)

Specially denatured alcohol formula No. 4 prepared from alcohol of over 150° proof will no longer be permitted to be withdrawn for use in the manufacture of cigars, or fluids, sprays, or other liquors designed or intended for use in the manufacture of cigars.

In all cases where special Formula No. 4, prepared from alcohol, has been authorized for use heretofore in the manufacture of cigars, or fluids, sprays, or other liquids designed or intended for use in the manufacture of cigars, administrators may authorize the use of rum denatured in accordance with Formula No. 4 of not over 150° proof, or alcohol distilled at not over 150° proof, having the characteristic congeneric constituents of rum of like proof denatured in accordance with Formula No. 4 for the specific uses and formulas heretofore approved.

Uses: Cigarettes, casing fluids and cigars, smoking and chewing tobacco.

Formula No. 5: To 100 gals. of ethyl alcohol add 65 lbs. sulfuric ether, 3 lbs. cadmium iodide, 3 lbs. ammonium iodide. May be shipped in barrels only.

Uses: Photo engravings, enlargements, photographic collodion, photoprints.

Formula No. 6-A: To 100 gals. of ethyl alcohol add 15 gals. of condensed fumes, recovered in the process of manufacture.

Uses: Fulminate of mercury.

Formula No. 6-B: To 100 gals. of ethyl alcohol add ½ gal. of pyridine bases.

Uses: Acetphenetidine, acetic ether, chloral hydrate, dichlorethane, ethyl acetate, ethyl bromide, ethyl butyrate, ethyl chloride, guaiacol, hydroquinone, para-fulminate of mercury, paraphenitidine.

Formula No. 11: To 100 gals. of ethyl alcohol add 100 lbs. of sulfuric ether and 10 lbs. of cadmium iodide.

May be shipped in barrels only.

Uses: Photographic collodion, photo engraving, photo prints.

Formula No. 12-A: To 100 gals. of ethyl alcohol add 5 gals. of benzene.

Uses: Acetphenetidine, anhydrous soap, barbital, benzoic acid, citronellol, cleaning fluid, dye intermediates, dyeing, ethyl acetate, ethyl ester, experimental purposes, geraniol, hydrazoanisole, imitation leather, imitation rubber, liquid sealing compound, milk protein, paranitrophenatole, refined potassium and sodium hydrate, refined petroleum products, sanatogen, saponification of the waxes of acid-fast bacteria, shoe dressing, smokeless powder, solvent for celluleather, sutures and ligatures, terpine hydrate, trinitrotoluene, tubes (collapsible), urea.

Formula No. 13-A: To 100 gals. of ethyl alcohol add 10 gals. of sulfuric ether.

(Prohibition officers are instructed to exercise great caution in recommending the granting of permits for the use of this formula, both as to the standing and responsibility of the applicant and the character of the premises described in the application. A very careful and close surveillance of such factories must be maintained.)

Uses: Acetic ether, ammonium salts of lauric and oleic acids, anesthetic ether, arsphenamine, butyric ether, caproic acid, caproic ether, celery oil, certified food colors, chemical preparations, collodion, dry extracts for food products, insulin, neosalvarsan, neoarsphenamine, photo-engravings, propionic ether, protargentum, sodium ethyl sulfate, sulfuric ether, salvarsan.

Formula No. 15: To 100 gals. of ethyl alcohol add 3 gals. of sulfuric acid and 1 gal. of kerosene. May be shipped in barrels only.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Specially Denatured Alcohol (cont.)

(After the tax-free alcohol has all been converted into nitrous ether it will be permissible for the manufacturer to add alcohol in order to dilute the product so that it may be more readily transported, or for other purposes, but such added alcohol must in all cases be tax-paid alcohol.)

Uses: Ethereal oil, ethyl bromide, ethyl chloride, ethyl nitrite, nitrous ether, pure acetic ether.

Formula No. 17: To 100 gals. of ethyl alcohol add 0.05 gal. (6.4 fluid ozs.) of animal oil (Dipples).

Uses: Acetphenetidine, acetic ether, chloral hydrate, dichloroethane, ethyl acetate, ethyl chloride, ethylene gas, para-phenitidine.

Formula No. 18: To 100 gals. of ethyl alcohol of not less than 100° proof add 100 gals. of vinegar, containing not less than 9% acetic acid. May be shipped in barrels only.

Uses: Acetate of lime, acetone, vinegar.

Formula No. 19: To 100 gals of ethyl alcohol add 100 gals. of ethyl ether. May be shipped in drums only.

Uses: Artificial silk, backing of films, byproducts from distillery slops (see also formula 3-A), collodion, ethyl acetate, iodizers, lithographers' transfers, photofilms, photo engravings, solvent for nitrocellulose.

Formula No. 20: To 100 gals of ethyl alcohol add 5 gals. crude chloroform. To be used in a closed and continuous process only.

Uses: Chloroform (conditional).

Formula No. 22: To 100 gals. of ethyl alcohol add 10 gals. solution formaldehyde conforming to specifications of U.S.P. Amount of denatured alcohol to be used in finished product not to exceed 20%. May be shipped in barrels only.

Uses: For preserving formaldehyde, U.S.P., embalming fluid, remedies for treatment of honeycombs.

Formula No. 23: To 100 gals. of ethyl alcohol add 10 gals. acetone and 2 gals. benzene.

Uses: Alcoholic dye solutions, liniments and lotions for external use only (conditional), xanthates.

Formula No. 23-A: To 100 gals. of ethyl alcohol add 10 gals. acetone, U.S.P.

(Administrators may approve the manufacture of rubbing alcohol only with specially denatured alcohol formula 23-A. The bonded manufacturer is required to medicate the preparation by the addition of any two of the following agents in the quantities indicated: Zinc sulfocarbolate, 4 grains per fluid oz.; boric acid, 5 grains per fluid oz.; tincture ethylphthalate, 1%. The alcoholic content quassia, U.S.P., 2 minims per fluid oz.; di- of these preparations shall not exceed 70% by volume. The manufacturer may add such odorous constituents as is desired.)

Uses: Deodorants and substances of similar nature, fungicides, fur luster, leather dressing, lacquer solvents, lacquer thinners, liniments and lotions for external purposes, pipe-cleaning preparations, solid and powdered extracts.

Formula No. 23-B: To 100 gals. of ethyl alcohol add 15 lbs. of camphor, U.S.P., 2 lbs. of menthol crystals, U.S.P., 3 lbs. of carbolic acid, U.S.P. May be shipped in barrels only.

Uses: Liniments and lotions for external purposes only.

Formula No. 23-C: To 100 gals. of ethyl alcohol add 10 lbs. carbolic acid, U.S.P., 15 lbs. resorcinol, U.S.P., 5 lbs. oil of wintergreen, U.S.P., or methyl salicylate, U.S.P. May be shipped in barrels only.

Uses: Liniments and lotions for external purposes only.

Formula No. 23-D: To 100 gals. of ethyl alcohol add 20 lbs. tannic acid, U.S.P., 25 lbs. gum camphor, U.S.P. May be shipped in barrels only.

Uses: Liniments and lotions for external purposes only.

Formula No. 23-E: To 100 gals. of ethyl alcohol add 9 lbs. oil of bitter almonds, U.S.P., 6 lbs. salicylic acid, U.S.P. May be shipped in barrels only.

Uses: Liniments and lotions for external purposes only.

Formula No. 23-F: To 100 gals. of ethyl alcohol add 3 lbs. salicylic acid, U.S.P., 1 lb. resorcinol, U.S.P., 1 gal. oil of bergamot, N.F. IV. May be shipped in barrels only.

Uses: Liniments and lotions for external purposes only.

Formula No. 24: To 100 gals. of ethyl alcohol add 29 gals. of sulfuric acid. May be shipped in glass only.

(Note.—Manufacture of phenacetin: No part of the alcohol to remain in the finished product, which product must meet the specifications of the United States Pharmacopoeia. Alcohol so denatured to be used in the complete process for the manufacture of phenacetin and not merely for any one stage. Process to be closed and continuous.)

Uses: Phenacetin, ethyl acetate (conditional), ethyl butyrate, ethyl propionate, ethyl valeriate.

Formula No. 25: To 100 gals. of ethyl alcohol add 20 lbs. of iodine, U.S.P., 15 lbs. of potassium iodide, U.S.P. May be shipped in barrels (special) or glass.

Uses: Tincture of iodine, U.S.P., tr. iodi Fortier, N.F., tr. iodine Churchill's.

Formula No. 25 Alt.: To 100 gals. of ethyl alcohol add a solution composed of 20 lbs. iodine, U.S.P., 15 lbs. potassium iodide, U.S.P., 15 lbs. water. May be shipped in barrels only.

Uses: Tincture of iodine, U.S.P., tr. iodi Fortier, N.F., tr. iodine Churchill's.

Formula No. 26: To 100 gals. of ethyl alcohol add 5 gals. aniline oil.

(Note.—Officers are instructed to exercise great caution in recommending the granting of permits for the use of this denaturant, both as to the standing and responsibility of the applicant and the character of the premises described in the application, and in every case the application is to be accompanied by blue print, the same to be duly sworn to, and a detailed description of the process.

Uses: Ethylaniline, diethylaniline, dyes and intermediates.

Formula No. 27: To 100 gals. of ethyl alcohol add 1 gal. oil of rosemary, 30 lbs. of camphor.

Uses: Soap liniment, U.S.P., chloroform liniment, U.S.P.

Formula No. 27-A: To 100 gals. of ethyl alcohol add 35 lbs. camphor, U.S.P., 1 gal. oil of cloves, U.S.P.

Uses: Antiseptic hand lotions and liniments for external purposes only.

Formula No. 27-B: To 100 gals. of ethyl alcohol add 1 gal. oil lavender flowers, U.S.P., and 100 lbs. soft soap, U.S.P.

Uses: Liniment of soft soap, U.S.P. (tincture of green soap).

Formula No. 28: To 100 gals. of ethyl alcohol add 10 gals. of approved benzene. To be used in a closed and continuous process.

Uses: Motor fuel (conditional).

Formula No. 28-A: To 100 gals. of ethyl alcohol of not less than 198° proof add 1 gal. of gasoline. May be shipped in tank cars or drums.

Uses: Motor fuels (conditional).

Formula No. 29: To 100 gals. of ethyl alcohol add 5 gals. of an alcoholic solution of acetal-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Specially Denatured Alcohol (cont.)
dehyde containing not less than 20% of acetaldehyde.

Uses: Aldehydes (conditional), chloroform, ethyl chloride, ethyl butyrate, ethyl lactate, ethyl propionate, ethyl valeriate, glacial acetic acid (conditional).

Formula No. 30: To 100 gals. of ethyl alcohol add 10 gals. pure methyl alcohol.

Uses: Artificial musks, celluloid cement, chemical and physical laboratory purposes, dental gold, digestive ferments and similar glandular products (provided they contain no alcohol), fur dyeing, hypodermic tablets, manufacturing vegetable oils, mercurochrome, mirrors, oleoresins, photo dry plates, vacuum tubes, varnish and white petroleum oils (conditional).

Formula No. 31-A: To 100 gals. of ethyl alcohol add 100 lbs. glycerol, U.S.P., 20 lbs. hard soap, good toilet grade, containing not in excess of 5% moisture.

Uses: Tooth paste.

Formula No. 31-B: To 100 gals. of ethyl alcohol add 5½ gals. oil of peppermint, U.S.P., 1¼ gals. eucalyptol, U.S.P., 4 lbs. menthol crystals, U.S.P.

Uses: Tooth paste.

Formula No. 31-C: To 100 gals. of ethyl alcohol add 33 lbs. citric acid, U.S.P., 33 lbs. menthol, U.S.P. May be shipped in barrels only.

Uses: Tooth paste.

Formula No. 32: To 100 gals. of ethyl alcohol add 5 gals. sulfuric ether.

Uses: Calorene gas, ethylene (conditional), washing food products.

Formula No. 33: To 100 gals. of ethyl alcohol add 30 lbs. methyl violet. May be shipped in barrels only.

Uses: Meat-branding inks (conditional).

Formula No. 33-A: To 100 gals. of ethyl alcohol add 13 pounds erythrosin.

(The erythrosin used in the above formula will be that described as No. 517 in A. G. Green's edition of the "Schultz-Julius Systematic Survey of the Organic Coloring Matters", published in 1904. May be shipped in barrels only.)

Uses: Incorporating certified color in food products, no alcohol to appear in the finished product when prepared for use.

Formula No. 34: To 100 gals. of ethyl alcohol add 5 gals. tetrachloroethane.

Uses: Artificial silk.

Formula No. 35: To 100 gals. of ethyl alcohol add 35 gals. ethyl acetate.

Uses: Aceto-para-aminophenolsalol and candy glaze.

Formula No. 35-A: To 100 gals of ethyl alcohol add 5 gals. ethyl acetate.

(Note.—The above formula will only be authorized in manufacturing processes in which alcohol is handled in a closed system of pipes and vessels. Recovery will be permitted where desired. In making application for this formula detailed blue prints of the apparatus employed, together with a description of the process, must be submitted.

The ethyl acetate used in the above formula shall be that quality specified in the United States Pharmacopoeia, 10th revision, page 475).

Uses: Diastase, ethyl acetate, pectin.

Formula No. 36: To 100 gals. of ethyl alcohol add 3 gals. stronger ammonia water, U.S.P.

Uses: Shaving cream.

Formula No. 37: To 100 gals. of ethyl alcohol add 45 ozs. eucalyptol, U.S.P., 30 ozs. thymol, U.S.P., 20 ozs. menthol, U.S.P.

Uses: Antiseptic solutions and lotions for external purposes, suppositories.

Formula No. 37-A: To 100 gals. of ethyl alcohol add 5 lbs. menthol, U.S.P., 10 lbs. camphor, U.S.P.

Uses: Antiseptic solutions and lotions for external purposes.

Formula No. 38: To 100 gals. of ethyl alcohol add 5 gals. of a water solution of 60 ozs. zinc chloride, U.S.P., and 10 lbs. of any one of the following: methyl salicylate, U.S.P., oil of wintergreen, U.S.P., oil of cassia, U.S.P., oil of cloves, U.S.P., oil of peppermint, U.S.P. May be shipped in barrels only.

Uses: Mouth washes and dentifrices.

Formula No. 38-A: To 100 gals. of ethyl alcohol add 5 ozs. menthol crystals, U.S.P., 9 ozs. emetine hydrochloride, U.S.P., 16 lbs. benzoic acid, U.S.P. May be shipped in barrels only.

Uses: Dentifrices.

Formula No. 38-B: To 100 gals. of ethyl alcohol add a total of 10 lbs. of any of the U.S.P. oils and substances listed below, provided that not less than 2½ lbs. of any one be used. Oil of wintergreen, methyl salicylate, oil of cloves, peppermint, cassia, eucalyptus, rosemary, lavender, spearmint, thyme, sassafras, thymol, menthol crystals, eucalyptol, phenol, camphor, safrole (sp.gr. not less than 1.096 and not more than 1.110 at 16°C.), volatile oil mustard, oil of turpentine, oil of citronella (pure).

Any one desiring to use the above formula must specify in the application which substances from the above list are selected.

Uses: Lotions for external purposes, mouth washes and dentifrices.

Formula No. 38-C: To 100 gals. of ethyl alcohol add 160 oz. menthol, U.S.P., 1.25 gals. solution formaldehyde, U.S.P. May be shipped in barrels only.

Uses: Dentifrices.

Formula No. 38-D: To 100 gals. of ethyl alcohol add 40 ozs. menthol, U.S.P., 2½ gals. formaldehyde, 40%, U.S.P. May be shipped in barrels only.

Uses: Mouth washes and dentifrices.

Formula No. 38-E: To 100 gals. of ethyl alcohol add 5 gals. fluid extract ipecac, U.S.P., or 40 lbs. ipecac, U.S.P. May be shipped in barrels only.

Uses: Mouth washes and dentifrices.

Formula No. 39: To 100 gals. of ethyl alcohol add 9 lbs. sodium salicylate, U.S.P., or 9 lbs. salicylic acid, 1¼ gals. fluid extract quassia, U.S.P., 1 gal. of either of the following: acetone, U.S.P., isopropyl alcohol. May be shipped in barrels only.

Uses: Barbers' supply preparations.

Formula No. 39-A: To 100 gals. of ethyl alcohol add 1 gal. of either of the following: acetone, U.S.P., or isopropyl alcohol and 60 ozs. of any one of the following U.S.P. alkaloids or salts: quinine, quinine bisulfate, quinine hydrochloride, cinchonidine, or cinchonidine sulfate. May be shipped in barrels only.

Uses: Barbers' supply preparations.

Formula No. 39-B: To 100 gals. of ethyl alcohol add 2½ gals. diethylphthalate.

Uses: Perfumes, toilet water, barbers' supplies and lotions.

Formula No. 39-C: To 100 gals. of ethyl alcohol add 1 gal. diethylphthalate.

Uses: High grade perfumes and toilet waters containing not less than 2% by weight of essential oils or their equivalent in perfume materials.

Formula No. 39-D: To 100 gals. of ethyl alcohol add 50 ozs. quinine sulfate, or 200 ozs. sodium salicylate, and 1 gal. oil of bay, N.F. May be shipped in barrels only.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Specially Denatured Alcohol (cont.)

Uses: Bay rum and lotions for external purposes.

Formula No. 40: To 100 gals. of ethyl alcohol add 3 ozs. av. brucine sulfate, ½ gal. of either of the following: acetone, U.S.P., or isopropyl alcohol.

Uses: Perfumes and toilet preparations.

Formula No. 41: To 100 gals. of ethyl alcohol add 20 lbs. menthol crystals, U.S.P.

Uses: Solid confections and lozenges.

Formula No. 42: To 100 gals. of ethyl alcohol add 80 grams potassium iodide, U.S.P., 109 grams red mercuric iodide, U.S.P. May be shipped in barrels only.

Uses: Sterile surgical ligature.

Formula No. 43: To 100 gals. of ethyl alcohol add 30 lbs. methyl salicylate, U.S.P. May be shipped in barrels only.

Uses: Emulsions which contain no alcohol in the finished products.

Formula No. 44: To 100 gals. of ethyl alcohol add 10 gals. normal butyl alcohol.

Uses: Dikote solution, oil burner preparations, preparation of carbon eliminators in oil burners.

Formula No. 44-A: To 100 gals. of ethyl alcohol add 4 gals. of approved wood alcohol (denaturing grade) and 10 gals. of any one of the following denaturants: normal butyl alcohol, refined fusel oil, amyl alcohol (synthetic or natural).

Uses: Gum and pyroxylin solutions (not including pyroxylin plastics, artificial leather finishes) and shellac and lacquer substitutes, lacquers, lacquer thinners, solvents other than ethyl acetate or similar esters, spirits varnishes, varnish removers and similar preparations.

Formula No. 45: To 100 gals. of ethyl alcohol add 300 lbs. refined shellac. May be shipped in drums or barrels.

(Note.—Applications to use this formula will be approved only when filed by proprietors of bonded denaturing plants, and such persons will be allowed to sell or dispose of such specially denatured alcohol only after it has been compounded with other ingredients of the character and in the manner approved by this Department. Each application to use specially denatured alcohol Formula No. 45 should show the other ingredients which it is proposed to add and the process to be employed.)

Uses: Candy glaze.

Formula No. 46: To 100 gals. pure ethyl alcohol add 25 fluid ozs. phenol, U.S.P., 4 fluid ozs. oil of wintergreen or methyl salicylate, U.S.P. May be shipped in barrels only.

Uses: An antiseptic, sterilizing and bathing alcohol for use by visiting nurse associations, public nursing associations, clinics, and dispensaries exclusively.

Formula No. 47: To 100 gals. pure ethyl alcohol add 7 gals. fluid extract arnica flowers, National Formulary, third edition. May be shipped in barrels only.

Uses: Liniments and lotions for external purposes.

Containers: Tank cars, 8,000 gals.; steel drums, 53 gals.; wooden barrels, 50 gals.; wooden half barrels, 25 gals.; cans, 5 gals. and 1 gal. Shipped in all three containers unless otherwise specified.

Government regulations:

For information relative to the production, tax payment, etc., of industrial alcohol and to the manufacture, sale and use of denatured alcohol under Title III of the National Prohibition Act of October 28, 1919, consult the Regulations No. 3. This pamphlet was issued by the Bureau of Prohibition, Treasury Department, and may be procured from the Superintendent of Documents, United States Government Printing Office, Washington, D. C., at 20 cents per copy.

Denver Mud. See Kaolin cataplasm.

Deodorized Oils. Oils which have been subjected to hydrogenation or other treatment to remove objectionable odors, in order to make them fit for human consumption.

Depilatories. Sodium, potassium or barium sulfides used for the removal of hair. The leather industry uses large amounts of sodium sulfide as a dehairing agent. See Sodium sulfide.

Derby Red. See Chrome red.

Dermatol. See Bismuth subgallate.

Dermol (Bismuth chrysophenate) $Bi(C_{15}H_9O_4)2Bi_2O_3$.

Color and properties: Yellow, amorphous powder. Insoluble in water.

Uses: Medicine (skin diseases).

Railroad shipping regulations: None.*

Descloizite (a) $(PbZn)(PbOH)VO_4$;
(b) $(PbZn)_2(OH)VO_4$;
(c) $(PbZn)_2V_2O_8(PbZn)(OH)_2$.

Cherry-red, brownish-red, purplish-red to light or dark brown or black mineral. Orange or brown streak. Greasy luster. Often found in association with vanidinite (q.v.) or pyromorphite (q.v.). Various formulas have been assigned to it. Formula (a) contains 55.4% PbO, 19.7% ZnO, 22.7% V_2O_5, balance water. See also Cuprodescloizite.

Constants: Sp.gr. 5.9 to 6.2; hardness 3.5.

Occurrence: United States (Arizona, New Mexico), Argentine, Carinthia.

Desichthyol (Desichtol). Deodorized ichthyol (q.v.).

Desichtol. See Desichthyol.

Developing Agents. A term applied in the dyeing industry to certain organic compounds which, in combination with some other organic compound already deposited upon the fiber, will develop a colored compound, or if united with a dye already upon the fiber, will form a new coloring matter possessing a more desirable or a faster color.

Devil's Apple. See Stramonium.

Dextrin (British gum; Gommeline; Starch gum; Artificial gum; Vegetable gum; Leiocom; Sago dextrin; Tapioca dextrin).

Color and properties: Yellow or white amorphous powder or granules.

Soluble in water; insoluble in alcohol and ether.

Derivation: By heating dry starch to 200° to 250°C. in a revolving iron cylinder over a free flame, or in an oil bath, or in a steam-jacketed kettle; or the starch may be moistened with nitric or hydrochloric acid, dried at 50°C. and then heated to 140° to 170°C., giving a lighter colored product. The dextrin is powdered in a mill and sieved through a bolting cloth. Dextrin is prepared from the following starches: Cassava, corn, potato, sago or wheat.

Grades: Technical, yellow and white; granulated; precipitated by alcohol; N.F.

Containers: Bags; wooden barrels.

Uses: Adhesives; brewing; thickening tanning extracts; sizing paper and textiles; pharmacy; substitute for gum tragacanth and gum arabic; food (polishing rice and cereal grains, polishing coffee, baking, confectionery, etc.); decorating pottery and porcelain; distilled liquors; thickening dye pastes; pyrotechnics; matches; glass-silvering compositions; printing inks; black lithographic inks; felt manufacture; process engraving.

Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Dextrin, Cassava.
Derivation: A dextrin prepared from cassava starch.
Grades: Technical.
Containers: Bags; barrels.
Uses: Adhesives; textile printing, confectionery, etc.
Railroad shipping regulations: None.*

Dextrin, Crystallized. A brittle mass produced by decolorizing dextrin with animal charcoal and evaporating the product.

Dextroform. Analogous to amyloform (q.v.) but using dextrin instead of starch.

Dextroglucose. See Dextrose.

Dextrose (Dextroglucose; Baker's sugar; Grape sugar; Corn sugar) $C_6H_{12}O_6.H_2O$.
Color and properties: White amorphous anhydrous lumps or powder.
Soluble in water.
Derivation: Hydrolysis of starch and starchy substances by action of hydrochloric acid; pure dextrose is obtained by complete conversion under proper conditions; incomplete conversion gives glucose, a mixture of dextrose, dextrin and water. See also Glucose.
Grades: Technical; U.S.P.; C.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 50-100 lb. slabs; 100 lb. bags; 400 lb. barrels.
Uses: Confectionery; jams; various foods; preparing tobacco; chrome-tanning liquors; logwood and dyewood liquors; brewing and wine manufacture; sizing, weighting and ingredient of printing pastes for textiles; viscose and cuprammonium rayon precipitating baths; medicine (vehicle and pill excipient).
Railroad shipping regulations: None.*

Dextrotartaric Acid. See Tartaric acid.

Diabase. A basic igneous rock usually occurring in dikes or intrusive sheets, and composed essentially of plagioclase feldspar and augite with small quantities of magnetite and apatite. The plagioclase forms lath-shaped crystals lying in all directions among the dark irregular augite grains, giving rise to the peculiar diabasic or ophitic texture, which is a distinctive feature in the coarser-grained occurrences. Canada, Connecticut, Maryland, Massachusetts, Newfoundland, New Jersey, New York and Virginia.

Diacetic Ether. See Ethylacetoacetate.

Diacetone Alcohol (4-Hydroxy-2-keto-4-methyl pentane) $CH_3COCH_2C(CH_3)_2OH$.
Color and properties: Colorless to light straw-colored liquid.
Constants: Sp.gr. 0.915 to 0.920 (20/20); acidity, neutral to litmus; residue on evaporation, less than 0.005% by weight when 50 cc. of diacetone alcohol is heated to 170°C. for one hour after evaporation on water bath; no turbidity when mixed with 60°Bé. benzine in volumetric proportions of 1: 1.
Miscible with distilled water in all proportions.
Grades: Acetone-free; not more than 16° acetone.
Containers: Crated cans (1, 5 gals.); 50, 100 gal. steel drums.
Uses: Cellulose acetate films and dopes; solvent for celluloid, dyes, resins and waxes.
Railroad shipping regulations: Red label.

Diacetyldihydromorphine. See Paralaudin.

Diacetylmorphine (Heroin) $C_{17}H_{17}NO(C_2H_3O_2)_2$.
Color and properties: White crystalline alkaloid; poisonous; habit-forming drug!
Constants: M.p. 173°C.
Soluble in alcohol.
Derivation: By the acetylization of morphine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Prohibited in the United States because of its habit-forming character. Formerly used in medicine as a sedative.
Railroad shipping regulations: None.*

Diacetylmorphine Hydrochloride. See Heroin hydrochloride.

Diacetyltannin. See Acetyltannic acid.

Dial (Diallyl barbituric acid).
Color and properties: Colorless, shiny, scaly crystals. Stated to be less toxic than barbital, to need smaller doses and not to produce unpleasant after effects. This has been questioned by the Council on Pharmacy and Chemistry.
Constants: M.p. 170° to 171°C.
Soluble in alcohol and ether; difficultly soluble in water.
Uses: Medicine (somnifacient, unofficial).
Railroad shipping regulations: None.*

Diallage $Ca(MgFe)(SiO_3)_2$.
A complex natural silicate grading into augite (q.v.) with the addition of alumina. Color, green, brown or gray. Used as ornamental stone.

Diallylbarbituric Acid. See Dial.

Diamalt, Special. See Diastase, malt.

Diamine $(NH_2)_2$.
A strong base crystallizing at 1.4°C. and boiling at 113°C.
Soluble in water.

3:6-Diaminoacridinium Hydrogen Sulfate. See Proflavine.

Diaminoazotoluene (Diaminoazotoluol; Azoxytoluidene) $C_6H_3(CH_3)(NH_2)N_2OC_6H_3(NH_2)(CH_3)$.
Color and properties: Yellow or orange crystals.
Constants: M.p. 168°C.
Soluble in alcohol; insoluble in water.
Derivation: By alkaline reduction of para-nitro-ortho-toluidine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes.
Railroad shipping regulations: None.*

Diaminoazotoluol. See Diaminoazotoluene.

Diaminobenzene. See Phenylenediamine.

3-Diamino-4-dihydroxy-1-arsenobenzene, Hydrochloride. See Arsphenamine.

3-Diamino-4-dihydroxy-1-arsenobenzene, Sodium Salt. See Sodium arsphenamine.

Diaminodiphenic Acid (Benzidinedicarboxylic acid) $C_6H_3(CO_2H)NH_2C_6H_3(CO_2H)NH_2$.
Color and properties: White crystals. Soluble in alcohol and ether; insoluble in water.
Derivation: By boiling meta-nitrobenzaldehyde with caustic soda, reducing with zinc dust and acidifying.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyestuffs.
Railroad shipping regulations: None.*

Diaminodiphenyl. See Benzidine.

Diaminodiphenyl Sulfate. See Benzidine sulfate.

Diaminodiphenylamine (Para: para'-Diaminodiphenylamine) $HN(C_6H_4NH_2)_2$.
Color and properties: Yellowish crystals.
Constants: M.p. 158°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the reduction of the blue indamine obtained by the oxidation of the hydrochlorides of aniline and para-phenylenediamine.
Method of purification: Crystallization.
Grades: Technical
Containers: Wooden barrels.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diaminodiphenylamine, Para: Para'-. See Diaminodiphenylamine.

Diaminodiphenylethylene. See Diaminostilbene, Para-.

Diaminodiphenylmethane
$NH_2C_6H_4CH_2C_6H_4NH_2$.
Color and properties: Large silvery crystals.
Constants: M.p. 86°C.
Soluble in water, alcohol, ether and benzene.
Derivation: By heating formaldehyde anilide with aniline hydrochloride and aniline.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes.
Railroad shipping regulations: None.*

Diaminodiphenylthiourea
$C_6H_4(NH_2)NHC_6H_4(NH_2)NHCS$.
Color and properties: Colorless plates or crystalline solid.
Constants: M.p. 195°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By boiling para-phenylenediamine with carbon bisulfide.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diaminodiphenylurea
$C_6H_4(NH_2)(NH)C_6H_4(NH_2)(NH)$.
Color and properties: Colorless plates.
Soluble in alcohol and hot water; sparingly soluble in cold water.
Derivation: By the reduction of tetranitrodiphenylurea.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diaminoditolylmethane
$NH_2C_7H_6CH_2C_7H_6NH_2$.
Color and properties: Glistening, crystalline plates.
Constants: M.p. 149°C.
Soluble in alcohol and ether.
Derivation: By heating formaldehyde and orthotoluidine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diaminoethoxydiphenyl. See Ethoxybenzidine.

3:6-Diamino-10-methylacridinium Chloride. See Acriflavine base.

3:6-Diamino-10-methylacridinium Chloride Hydrochloride. See Acriflavine hydrochloride.

Diaminonaphthalene (Naphthalenediamine)
$C_{10}H_6(NH_2)_2$.
Color and properties: Colorless crystals.
Constants: M.p. 190°C.; b.p.: Sublimes.
Soluble in alcohol and hot water; very sparingly soluble in cold water.
Derivation: (a) By the reduction of alpha-dinitronaphthalene. (b) By heating dihydroxynaphthalene with aqueous ammonia.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

4:5-Diamino-2:7-naphthalenedisulfonic Acid. See 1:8-Naphylenediamine-3:6-disulfonic acid.

4:8-Diamino-2:6-naphthalenedisulfonic Acid. See 1:5-Naphylenediamine-3:7-disulfonic acid.

1:4-Diamino-2-naphthalenesulfonic Acid. See 1:4-Naphthylenediamine-2-sulfonic acid.

5:7-Diamino-2-naphthalenesulfonic Acid. See 1:3-Naphylenediamine-6-sulfonic acid.

Diaminophenol, Ortho- $C_6H_3OH(NH_2)_2$.
Color and properties: Gray-white crystals.
Constants: M.p. 49°C.; b.p. 299°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the reduction of dinitrophenol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; glass bottles.
Uses: Photographic developer; organic synthesis.
Railroad shipping regulations: None.*

Diaminophenol, Para- $C_6H_3OH(NH_2)_2$.
Color and properties: Gray-white crystals.
Constants: M.p. 53°C.; b.p. 302°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By the reduction of dinitrophenol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; glass bottles.
Uses: Photographic developer; organic synthesis.
Railroad shipping regulations: None.*

Diaminophenol Hydrochloride (Amidol)
$C_6H_3(NH_2)_2OH.2HCl$.
Color and properties: Grayish-white crystals.
Soluble in water; slightly soluble in alcohol.
Derivation: By the interaction of diaminophenol and hydrochloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Kegs; boxes; glass bottles.
Uses: Photographic developer.
Railroad shipping regulations: None.*

Diaminostilbene, Para- (Diaminodiphenylethylene)
$C_6H_4(NH_2)CHCHC_6H_4(NH_2)$.
Color and properties: Colorless needles or plates.
Constants: M.p. 227°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the reduction of dinitrostilbene.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Preparation of dyes.
Railroad shipping regulations: None.*

Diaminostilbenedisulfonic Acid
$C_6H_3(NH_2)(SO_3H)CHCHC_6H_3(SO_3H)(NH_2)$.
Color and properties: Yellowish microscopic needles.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the reduction of dinitrostilbenedisulfonic acid with ferrous hydrate and ammonia.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes; intermediates.
Railroad shipping regulations: None.*

Diaminotoluene. See Toluylenediamine, meta-.

Diaminotoluol. See Toluylenediamine, meta-.

Diaminoditolyl. See Tolidin.

Diammonium Phosphate. See Ammonium phosphate; see also Diammonphos IG.

Diammonium Phosphate-Ammonium Sulfate Double Salt. See Leunaphos.

Diammonphos IG.
A proprietary brand of fertilizer prepared from German synthetic ammonia. It is said to consist of a light gray crystalline salt containing 21% nitrogen and 51.4% water-soluble phosphoric acid.
Soluble in water.
Derivation: By neutralizing phosphoric acid with ammonia liquor.
Containers: Burlap sacks.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Diamond C.
A mineral consisting essentially of carbon crystallized in the isometric system, generally in octahedron form. Color white or colorless, sometimes tinted blue, blue-white, pink, red, brown, green, orange, yellow, black. Brilliant adamantine luster when polished, but similar to oiled glass when unpolished. Usually transparent but sometimes translucent.
Constants: Sp.gr. 3.145 to 3.525; hardness 10.
Varieties:
Bort (Boort). Rounded types with uneven exterior. Radiated or confused crystalline structure. Technically any diamond or diamond fragment not worth while cutting.
Carbonado. Massive, crystalline, granular or compact. Black color. From Brazil.
Ordinary. Crystals with rounded faces. Ranges from stones of the first water (colorless and flawless) through various color tints, usually yellow and sometimes full of flaws.
Occurrence: United States (North Carolina, Georgia, Virginia, Colorado, California, Wisconsin, Arkansas, Idaho, Oregon), South Africa (world's principal supply), Brazil, India, Borneo, Australia, Russia.
Uses: Gem stones. Other uses: glass cutters; diamond drill bits; wire drawing; manufacture of tungsten electric light filaments. The fine powder is used for polishing and grinding gem stones.

Diamond Dust. See Diamond.

Diamond Gum. Proprietary name for a gum used for sizing and finishing fabrics.

Diamondite. A trade name for cemented tungsten carbide (q.v.).

Diamonds, Bristol. See Rock crystal.

Diamonds, Lake George. See Rock crystal.

Diamonds, Marmorosch. See Rock crystal.

Diamorphine Hydrochloride. See Diacetylmorphine hydrochloride.

Diamyl Ether. See Amyl oxide.

Diamyl Phthalate.
Color and properties: White to light straw-colored liquid.
Constants: Sp.gr. 1.023 (20°C.); wt. per gal. 8.52 lbs.
Grades: Technical (95-100%).
Containers: 5, 10, 50, 100 gal. drums; 5 gal. cans.
Uses: Solvent and plasticizer for nitrocellulose.
Railroad shipping regulations: None(?)*

Diamylene. See Dipentene.

Dianisidine (Di-para-aminodimethoxydiphenyl) $[C_6H_3(OCH_3)NH_2]_2$.
Color and properties: White crystals.
Constants: M.p. 137°C.
Soluble in alcohol and ether.
Derivation: The methyl ether of ortho-nitrophenol is reduced by zinc dust and caustic soda to the hydrazo compound, which is then boiled with hydrochloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: 350 lb. wooden barrels.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Diaphtherin (Oxychinaseptol) $HOC_6H_4SO_3H[C_9H_6(OH)N]_2$.
Color and properties: Yellow crystals.
Constants: M.p. 85°C.
Soluble in water and dilute alcohol.
Derivation: By uniting two molecules of oxyquinoline with one of phenolsulfonic acid.
Uses: Medicine (more powerful antiseptic than phenol, wounds, nasal catarrh, unofficial).
Railroad shipping regulations: None.*

Diarsenol. See Arsphenamine.

Diaspirin (Succinylsalicylic acid) $(CH_2COOC_6H_4COOH)_2$.
Color and properties: White powder, odorless, acid taste.
Constants: M.p. 178°C.
Slightly soluble in water; soluble in alcohol.
Uses: Medicine (antirheumatic, antineuralgic, unofficial).
Railroad shipping regulations: None.*

Diaspore $Al_2O_3.H_2O$ or $AlO(OH)$.
A natural hydrated alumina. Color, gray, white, pink, yellow, brown; streak white. Brilliant luster, pearly on cleavage face, elsewhere vitreous. Mostly found with emery or corundum (q.v.). Contains 85.1% Al_2O_3, balance water. See also Bauxite.
Constants: Sp.gr. 3.3 to 3.5; hardness 6.5 to 7.

Diastafor. See Diastase, malt.

Diastase, Malt (Diax; Diastafor; Special diamalt; Diastasum, U.S.P.; Amylase). An amylolytic enzyme.
Color and properties: Yellowish-white amorphous powder, or syrupy liquid.
Soluble in water; almost insoluble in alcohol.
Derivation: The filtrate from the mash of malted grain is concentrated at low temperatures in vacuum. The sugar acts as preservative. It converts insoluble starch and starch paste into soluble malto-dextrins and maltose.
Containers: Wooden kegs; cans.
Uses: Desizing of textiles, making up colors for calico, printing, finishing of textiles; medicine; breadmaking; malted foods.
Railroad shipping regulations: None.*

Diastase, Taka (Koji).
Color and properties: Whitish-yellow, very hygroscopic powder; converts over 100 times its weight of starch into maltose.
Derivation: An amylolytic enzyme produced by the action of Aspergillus oryzal on rice.
Grades: Technical.
Containers: Wooden kegs.
Uses: Fermentation agent.
Railroad shipping regulations: None.*

Diastasum, U. S.P. See Diastaste, malt.

Diatol. A trade name for a solvent containing over 90% diethyl carbonate. It is a stable ester of the medium-boiling class used in lacquers.

Diatomaceous Earth (Kieselguhr; Kieselgur; Guhr; Infusorial earth; Fossil flour; Tripolite; Ceyssatite; Tellurine; Terra silicea).
A soft earthy rock composed of the siliceous skeletons of small aquatic plants called diatoms. As marketed it consists of blocks or bricks or white (sometimes grayish, greenish, yellowish or brownish) powder or lumps resembling chalk or dried clay in appearance. It is very light (sp.gr., air dried 0.24; calcined 0.34) and porous and is capable of taking up and holding four times its weight of water. A very poor conductor of heat, sound and electricity, it resists all acids but hydrofluoric and is slowly dissolved by hot caustic alkali.
Typical Analyses:

	Per Cent		
	1	2	3
Silica	81.53	72.50	86.89
Alumina	3.43	11.71	2.32
Ferric Oxide	3.34	2.35	1.28
Lime	2.61	0.32	0.43
Magnesia	....	0.83	....
Potash	1.16	1.88	3.58
Soda	1.43	....	....
Ignition	6.04	9.54	4.89
Total	99.54	99.13	99.39

1 Maryland; 2 and 3 California.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Occurrence: United States (Alabama, California, Colorado, Delaware, Florida, Maryland, Maine, Massachusetts, Nebraska, Nevada, New Hampshire, New York, Oregon, South Carolina, South Dakota, Utah, Vermont, Virginia and Washington), Germany, France, Scotland, Ireland, Italy, Australia, Norway, Denmark, Hungary, Algeria, Chile, Austria.
Grades: Technical, U.S.P.
Containers: Bags; bulk in cars.
Uses: Clarifying, filtering and decolorizing agent in manufacture of glue and other adhesives, soap, metallurgical solutions, shellacs and varnishes, serum preparations, tanning liquors, fruit juices; absorbent in manufacture of disinfectants, fireworks; filler in manufacture of sealing wax, match heads, textiles, plastic compositions, papier maché; filler and heat resistor in various insulating compositions and cements, bricks, tile, plaster, artificial stone, etc.; filler between walls and floors for insecticidal purposes and fungi- and dry-rot preventatives; abrasive in domestic, glass and metallurgical polishing powders, dentifrices, manicuring powders, etc.; chemical industry in gas absorption towers; the manufacture of water glass and pure silica; packing in carboy containers; diffusion agent in the aeration of solutions; holder or absorbent for various catalysts; partial replacement of lime in sand-lime mortar; ingredient of textile fireproofing agents.
Railroad shipping regulations: None.*

Diax. See Diastase, malt.

Diazoaminobenzene (Diazoaminobenzol; Diazobenzeneanilide; Benzeneazoanilide; Benzolazoaniline) $C_6H_5NNNHC_6H_5$.
Color and properties: Golden-yellow scales. Explodes on heating.
Constants: M.p. 96°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: By the interaction of nitrous acid and an alcoholic solution of aniline.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis; dyes.
Railroad shipping regulations: None.*

Diazoaminobenzol. See Diazoaminobenzene.

Diazobenzeneanilide. See Diazoaminobenzene.

Diazobenzenesulfonic Acid, Para-. $C_6H_4NSO_3N$.
Color and properties: White paste.
Caution: May explode if heated.
Soluble in water and ether; insoluble in alcohol.
Derivation: By the action of nitrous acid on parasulfanilic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyestuffs.
Railroad shipping regulations: None(?)*

1-Diazo-2-naphthol-4-sulfonic Acid $C_{10}H_5N_2(OH)_2SO_3H$.
Color and properties: Yellow needles in paste or dry form.
Constants: Decomposed by heating above 100°C.
Slightly soluble in water.
Derivation: Diazotization of 1-amino-2-naphthol-4-sulfonic acid and filtering of the diazo compound.
Method of purification: None.
Grades: Technical.
Containers: Wooden barrels.
Uses: Azo dyes.
Fire hazard: The dry product can be ignited by sparks or a flame and burns off under explosion.
Railroad shipping regulations: None(?)*

Diazotizing Salts. See Sodium nitrite.

Dibenzoyl. See Benzil.

Dibenzylaniline $C_6H_5N(CH_2C_6H_5)_2$.
Color and properties: Yellowish-white crystals.
Constants: M.p. 70°C.; b.p. above 300°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: Aniline, benzyl chloride and sodamide are mixed together and then heated on water bath until ammonia is all driven off, resulting in the formation of dibenzylaniline.
Method of purification: Vacuum distillation.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Dibromin (Dibromomalonylureide).
Color and properties: Cream-colored crystalline solid; contains 56% bromine.
Soluble in water (solutions not stable).
Uses: Powerful germicide (claimed to be 50 to 200 times as powerful as phenol, depending on the species of bacteria it is used against).
Railroad shipping regulations: None.*

Dibromoanthracene (Alpha-dibromoanthracene) $C_6H_1C_2Br_2C_6H_4$.
Color and properties: Yellow crystals.
Constants: M.p. 221°C.; b.p.: Sublimes.
Soluble in chloroform; slightly soluble in alcohol and ether; insoluble in water.
Derivation: By the bromination of anthracene.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Dibromoanthracene, Alpha. See Dibromoanthracene.

Dibromobenzene, Para- (Benzene dibromide, para-) $C_6H_4Br_2$.
Color and properties: Colorless crystals.
Constants: M.p. 89°C.; b.p. 219°C.
Soluble in alcohol and ether.
Derivation: Obtained by the interaction of benzene with an excess of bromine in presence of a little iron.
Method of purification: Crystallization.
Impurities: Monobromobenzene.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Dibromobenzol. See Dibromobenzene, Para-.

Dibromocinnamic Acid Glycerol Ester. See Glycobrom.

Dibromoethane. See Ethylene bromide.

Dibromohydrocinnamic Acid Ethyl Ester. See Zeobromal.

2:7-Dibromo-4-hydroxymercurifluorescein, Disodium Salt (Mercurochrome—220 soluble; Mercuranine).
Color and properties: Iridescent green scales or granules; odorless; slightly hygroscopic. Incompatible with acids, salts of majority of alkaloids and majority of local anesthetics.
Soluble in water; practically insoluble in alcohol; insoluble in chloroform and ether.
Uses: Medicine (powerful germicide, cystitis, urethritis, chancroidal ulcerations, eye and ear affections, septicemias, subcutaneous abscesses, retroperitoneal abscesses, gonorrhea, stain to prevent infection, unofficial).
Railroad shipping regulations: None.*

5:7-Dibromoisatin Chloride $C_8H_2Br_2ClNO$.
Soluble in organic solvents such as benzene, chlorobenzene, etc.
Derivation: Isatin is gently warmed with bromine in concentrated sulfuric acid, giving 5:7-dibromoisatin which is then warmed with phosphorus pentachloride in an organic solvent.
Grades: Technical.
Uses: Dyes.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Dibromoisobutane. See Butylene isobromide.

Dibromoketone $CH_3COCHBrCH_2Br$. A military poison gas used in the late war.

Dibromomalonylureide. See Dibromin.

Dibromopropyldiethylbarbituric Acid. See Diogenal.

2: 6-Dibromoquinonechlorimide $OC_6H_2Br_2NCl$.
Color and properties: Yellow crystals.
Derivation: Reduction product of dibromonitrophenol is oxidized with chlorine in presence of alkali.
Method of purification: Recrystallization.
Grades: Analytical.
Containers: Glass bottles.
Uses: Determination of phenolic substances.
Railroad shipping regulations: None.*

Dibromotannin Gelatin. See Bromocoll.

Dibutylamine $(C_4H_9)_2NH$.
Color and properties: A colorless liquid with strong amino odor.
Constants: B.p. 160°C.
Slightly soluble in water; soluble in alcohol.
Derivation: Synthetic.
Method of purification: Distillation.
Grades: Technical; C.P.
Containers: Carboys; drums.
Uses: Intermediate.
Railroad shipping regulations: None.*

Dibutylaminopropyl-para-aminobenzoate Normal Sulfate, Gamma-. See Butyn.

Dibutyl Phthalate $C_6H_4(COOC_4H_9)_2$.
Color and properties: A colorless, non-volatile, stable, oily liquid.
Constants: Sp.gr. 1.046 to 1.050 (20°/20°); acidity less than 0.035% as phthalic acid; wt. per gal. 8.71 lbs.
Grades: Technical, 99 to 100% dibutyl phthalate.
Containers: Crated cans (1, 5 gals.); 5, 10, 50, 100 gal. steel drums.
Uses: Plasticizer in nitrocellulose and cellulose acetate lacquers and in pyroxylin plastics; solvent for perfume oils; perfume fixative; lubricating agent.
Railroad shipping regulations: None.*

Dicalcium Ortho-phosphate. See Calcium phosphate, Dibasic.

Dichloramine-T (Toluenesulfondichloramide, para-) $CH_3C_6H_4SO_2NCl_2$.
Color and properties: Pale yellow crystals or yellow crystalline powder, containing not less than 28% nor more than 30% active chlorine; chlorine odor; stable when pure; decomposed slowly by air, impurities, chlorocosane and carbon tetrachloride; rapidly by impurities, petrolatums, kerosene, olive oil and alcohol.
Soluble in glacial acetic acid, chlorinated paraffin, hydrocarbons, eucalyptol, benzene, chloroform and carbon tetrachloride; almost insoluble in water.
Constants: M.p. 80°C.
Derivation: The product of a reaction between toluene-para-sulfonamine and calcium hypochlorite solution is acidified with acetic acid and subjected to extraction by chloroform. The chloroform solution is dried chemically, filtered and evaporated.
Uses: Medicine (disinfectant, infected wounds, mucous membranes of nose, throat and eye, burns).
Railroad shipping regulations: None.*

Dichlorbenzene. See Dichlorobenzene.

Dichlorbenzol. See Dichlorobenzene.

Dichlorethane. See Ethylene chloride.

Dichlorhydrin. See Dichlorohydrin, alpha-.

Dichloroacetic Acid (Bichloroacetic acid; Urner's liquid; Chloroacetic acid) $CHCl_2COOH$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 1.5724 (13°C.); m.p. —4°C.; b.p. 189° to 191°C.
Soluble in water, alcohol and ether.
Derivation: By the interaction of hydrated chloral and potassium cyanide and subsequent distillation.
Method of purification: Distillation.
Grades: Technical.
Containers: 9 lb. glass bottles (in cases); 150 lb. carboys.
Uses: Intermediates; pharmaceuticals.
Railroad shipping regulations: White label(?)*

Dichloroaniline $C_6H_3NH_2Cl_2$.
Color and properties: Light brown or amber-colored crystalline mass.
Constants: M.p. 47° to 50°C.; b.p. 251° to 252°C.
Insoluble in water; soluble in alcohol, benzene and dilute hydrochloric acid.
Derivation: Nitration of para-dichlorobenzene with subsequent reduction.
Method of purification: Steam or vacuum distillation.
Grades: Technical (96%).
Containers: 500 lbs. net barrels; kegs.
Uses: Intermediate for Schultz Dyes, No. 469, 470, 471, 472 and 218.
Railroad shipping regulations: None.*

Dichlorobenzaldehyde $C_6H_3Cl_2CHO$.
Color and properties: White crystals.
Soluble in alcohol and ether.
Derivation: By the chlorination of benzaldehyde in presence of iodine or antimony.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Dichlorobenzene (Dichlorobenzol; Dichlorbenzene) $C_6H_4Cl_2$.
Color and properties: Ortho-: Colorless liquid; Meta-: Colorless liquid; Para-: White crystals; volatile.

Constants:	Ortho-	Meta-	Para-
Specific gravity	1.3254	1.307	1.2675
Melting-point	—16.7°C.	—18°C.	53°C.
Boiling-point	179°C.	172°C.	173.7°C.

Solubilities: Ortho-: Soluble in alcohol; insoluble in water.
Meta-: Soluble in alcohol and ether; insoluble in water.
Para-: Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: By the further chlorination of monochlorobenzene.
Method of purification: Rectification.
Containers: Ortho-: 55, 110 gal. steel drums; para-: 5, 10, 25, 50, 150, 300 lb. steel barrels; 25, 50, 100, 200 lb. drums; cases (4 10 lb. cans), (8 5 lbs. cans), (24 1 lb. cans).
Grades: Technical.
Uses: Ortho-: Organic synthesis; dyes; sulfur removal from illuminating gas; solvent; fumigating and preservative paints; lacquers and varnishes (solvent); solvent for waxes. Para-: Insecticide; germicide; deodorant; dyes; intermediates; pharmacy (antiseptic, drug); mothproofing compositions; agriculture (fumigating soil to control the peach tree borer; destruction of the sugar cane grub, etc.).
Railroad shipping regulations: None.*

Dichlorobenzidine $C_6H_3ClNH_2C_6H_3ClNH_2$.
Color and properties: Crystalline solid.
Constants: M.p. 133°C.
Soluble in alcohol and ether.
Derivation: By the chlorination of diacetylbenzidine and subsequent saponification.
Method of purification: Crystallization.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Dichlorobenzol. See Dichlorobenzene.

Dichlorodiethyl Sulfide (Mustard gas; Yperite; Yellow cross gas; H.S.) $(CH_2ClCH_2)_2S$. A military poison gas used in the late war.

Dichloroethane. See Ethylene chloride.

Dichloroether (Dichloroethyl oxide) $CH_2ClCHClOC_2H_5$.
Color and properties: Colorless, inflammable liquid.
Constants: Sp.gr. 1.174; b.p. 140° to 145°C.
Soluble in alcohol and ether.
Derivation: By the chlorination of ethyl ether.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None(?)*

Dichloroethylarsine $AsC_2H_5Cl_2$. A military poison gas used in the late war.

Dichloroethylene.
Color and properties: Noncombustible liquid.
Constants: B.p. 55°C.
Uses: Solvents; anesthetic; antiseptic; organic synthesis; fermentation retarding agent; analytical reagent.

Dichloroethyl Oxide. See Dichloroether.

Dichlorohydrin, Alpha- (Alpha-propenyldichlorohydrin; Glycerin dichlorohydrin; Dichloroisopropyl alcohol; Dichlorhydrin) $CH_2ClCH(OH)CH_2Cl$.
Color and properties: Colorless, ethereal liquid.
Constants: Sp.gr. **1.396**; **b.p. 174°C.**
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By the interaction of glycerol and dry hydrochloric acid gas and subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Solvent for hard resins and nitrocellulose; manufacture of photographic lacquers, cement for celluloid; binder for water colors; organic synthesis.
Railroad shipping regulations: None.*

Dichloroisopropane. See Propylene dichloride.

Dichloroisopropyl Alcohol. See Dichlorohydrin, Alpha-.

Dichloromethane. See Methylene chloride.

Dichloromethyl Ether $(CH_2Cl)_2O$. A military poison gas used in the late war.

Dichlorophthalic Acid $C_6H_2Cl_2(CO_2)_2$.
Color and properties: Colorless, thick crystals.
Soluble in hot water.
Derivation: By oxidizing dichloronaphthalene tetrachloride with nitric acid.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes; intermediates.
Railroad shipping regulations: None.*

Dichroite. See Iolite.

Dicyanodiamide $NHC(NH_2)NHCN$.
Color and properties: Grayish-white powder.
Constants: M.p. 204° to 205°C.
Soluble in water and alcohol; sparingly soluble in ether.
Derivation: By heating cyanamide to 150°C.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Fertilizers.
Railroad shipping regulations: None.*

Didymia. See Rare earths.

Didymium. A mixture of Praseodymium and Neodymium.

Didymium Nitrate.
Color and properties: Violet-red, hygroscopic crystals. A mixture of praseodymium and neodymium nitrates.
Derivation: From monazite sand extraction, after removal of cerium and thorium.
Grades: Technical.
Containers: Wooden kegs.
Uses: Incandescent gas mantles.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Die Oils.
Neutral oils employed as lubricants for steel dies. One textbook cites the following typical constants: Gr. 30.5° to 34°Bé.; flash point 340° to 395°F.; fire test 400° to 450°F.; cold test 20° to 30°F.; Saybolt viscosity 80 to 240.
Railroad shipping regulations: None.*

Diethoxyethenyldiphenylamidine Hydrochloride, Para- (Phenacaine hydrochloride, para-; Holocaine hydrochloride) $CH_3CNC_6H_4OC_2H_5NHC_6H_4OC_2H_5HCl.H_2O$.
Color and properties: Small, colorless crystals; odorless; faintly bitter taste. Incompatible with alkalis. More toxic than cocaine, but quicker in action.
Constants: M.p. 189°C.
Soluble in alcohol, boiling water and chloroform; less so in cold water; insoluble in ether.
Uses: Medicine (local anesthetic for eye, unofficial).
Railroad shipping regulations: None.*

Diethylacetal. See Acetal.

Diethylaldehyde. See Acetal.

Diethylamine $(C_2H_5)_2NH$.
Color and properties: Volatile, colorless, inflammable, strongly alkaline liquid.
Constants: Sp.gr. 0.710; b.p. 56°C.
Soluble in water and alcohol.
Derivation: By the interaction of dilute potassium hydroxide and dinitrodiethylaniline or nitrosodiethylaniline.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Diethylaminoethyl-para-aminobenzoate Nitrate, Beta- See Aminobenzoyldiethylaminoethanol nitrate, para-.

Diethylaminophenol, Meta- (Diethyl-meta-aminophenol) $C_{10}H_{15}NO$.
Color and properties: White, crystalline solid.
Constants: M.p. 78°C.; b.p. 276° to 280°C.
Soluble in alcohol, caustic soda, ether.
Derivation: Diethylaniline is sulfonated with oleum, and the resulting diethylaniline-meta-sulfonic acid fused with caustic soda.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Diethylaminopropylcinnamate Hydrochloride, Gamma-. See Apothesine.

Diethylaniline $(C_2H_5)_2NC_6H_5$.
Color and properties: Yellowish to brownish inflammable liquid.
Constants: Sp.gr. 0.9351; m.p. −38° to −39°C.; b.p. 213.5°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: (a) By heating aniline, aniline hydrochloride and ethyl alcohol. (b) By heating

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

ethyl bromide, aniline and caustic soda in an autoclave.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diethylaniline-meta-sulfonic Acid $(C_2H_5)_2NC_6H_4SO_3H$.
Color and properties: White, crystalline.
Constants: M.p. 270°C.
Soluble in water.
Derivation: From diethylaniline by sulfonation with oleum.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Diethylbarbituric Acid. See Veronal.

Diethylbromoacetamine (Neuronal; Acetobromal) $Br(C_2H_5)_2CONH_2$.
Color and properties: Crystalline powder; bitter, cooling taste; camphor-like odor. Decomposed by hot water.
Constants: M.p. 66° to 67°C.
Slightly soluble in cold water.
Uses: Medicine (hypnotic, unofficial).
Railroad shipping regulations: None.*

Diethylcarbinol (Secondary normal amyl alcohol; 3-Pentanol) $(C_2H_5)_2CHOH$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.8271; b.p. 116°C.; weight per gal. 6.79 lbs.
Derivation: One of the fractions distilled from pentasol (q.v.).
Grades: Technical.
Containers: 1, 5, 10, 50, 100 gal. drums.
Uses: Raw material for flotation reagent; wax solvent.
Railroad shipping regulations: None.*

Diethyl Carbonate $C_2H_5CO_3C_2H_5$. A solvent, of pleasant odor, b.p. 125°C.

Diethylcarbonic Ether. See Ethyl carbonate.

Diethylenediamine. See Piperazine.

Diethylene Glycol $CH_2OHCH_2OCH_2CH_2OH$.
Color and properties: Clear, colorless, syrupy liquid; extremely hygroscopic; lowers freezing point of water.
Constants: B.p. 245°C.; weight per gal. 9.3 lbs. at 15.6°C.
Soluble in water, alcohol and ether.
Grades: Technical.
Containers: 5, 10, 55, 110 gal. drums; tank cars. Net contents 45, 90, 465, 930 lbs.; 8,000 gals.
Uses: Solvent for nitrocellulose gums, resins; moistening and softening agent for composition cork, glues, parchment paper, etc.; printing of textiles; manufacture of explosive, diethylene glycol dinitrate.
Railroad shipping regulations: None.*

Diethylene Glycol Ethyl Ether. See Carbitol.

Diethylene Oxide (1:4-Dioxan) $C_4H_8O_2$ $(CH_2OCH_2.CH_2OCH_2)$.
Color and properties: Colorless liquid, ethereal odor.
Constants: Sp.gr. 1.0418 (15°/15°); m.p. 9°C.; b.p. 100.8°C.
Soluble in alcohol, ether, water.
Derivation: (1) Ethylene glycol by treatment with acid. (2) From BB dichloroethyl ether by treatment with alkali.
Methods of purification: Distillation.
Grades: Refined.
Containers: Glass bottles; tin cans; galvanized drums.
Uses: Solvent for nitrocellulose and cellulose acetate; synthesis.
Fire hazard: Inflammable.*
Railroad shipping regulations: Red label(?)*

Diethylglycocollguaiacol Hydrochloride (Guaiasanol; Gujasanol) $CH_3OC_6H_4OCOCH_2N(C_2H_5)_2.HCl$.
Color and properties: White prisms; decomposed by alkalis liberating guaiacol; less toxic and irritant than guaiacol.
Constants: Fusing point 184°C.
Soluble in water.
Derivation: Interaction of acetochloroguaiacol and diethylamine.
Uses: Medicine (guaiacol substitute, pulmonary catarrh, seat worms, unofficial).
Railroad shipping regulations: None.*

Diethylglycocoll-para-amino-ortho-oxybenzoicmethyl Ester Hydrochloride (Nirvanin; Glycocaine) $C_6H_3OHCOOCH_3NHCOCH_2N(C_2H_5)_2$.
Color and properties: Colorless prismatic crystals; one-tenth as toxic as cocaine.
Constants: M.p. 185°C.
Uses: Medicine (antiseptic, local anesthetic, substitute for cocaine in infiltration anesthesia, dentistry, unofficial).
Railroad shipping regulations: None.*

Diethylketone (Metacetone; Propione; Ethyl propionyl) $C_2H_5COC_2H_5$.
Color and properties: Colorless, mobile, inflammable liquid; acetone-like odor.
Constants: B.p. 101°C.
Soluble in alcohol and ether.
Derivation: By distilling sugar with an excess of lime.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Medicine; organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Diethylmalonylurea. See Veronal.

Diethyl-meta-aminophenol. See Diethylaminophenol, meta-.

Diethyl Oxalate. See Ethyl oxalate.

Diethyl Phthalate.
Color and properties: Water-white liquid.
Constants: Sp.gr. 1.119 (20°C.); wt. per gal. 9.32.
Grades: Technical (99-100%).
Containers: 5, 10, 50, 100 gal. drums; 5 gal. cans.
Uses: Solvent and plasticizer.
Railroad shipping regulations: None(?)*

Diethyl Sulfate $(OC_2H_5)_2SO_2$.
Color and properties: Colorless liquid; ethereal odor; irritating after-effect.
Constants: Sp.gr. 1.185; b.p. 208°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the action of fuming sulfuric acid on ethyl alcohol.
Method of purification: Rectification in vacuo.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diethyl Sulfide. See Ethyl sulfide.

Diethylsulfondimethylmethane. See Sulfonal.

Diethylsulfonemethylethylmethane. See Sulfone-ethylmethane.

Diethyl Tartrate $(C_4H_4O_6(C_2H_5)_2$. A solvent used as a plasticizer for automobile lacquers; b.p. 280°C.

Diethyl Valeriamide. See Valyl.

Difluorodiphenyl $C_6H_4F.C_6H_4F$.
Color and properties: Colorless, crystalline powder; aromatic odor.
Constants: Sp.gr. 1.04; m.p. 88° to 89°C.; b.p. 254° to 255°C.
Soluble in alcohol, ether, chloroform and oils; insoluble in water.
Derivation: By passing gaseous hydrofluoric acid

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

into the product of the reaction of an excess of piperidine on diazotized benzidine.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Diformyl-meta-tolylenediamine.
Color and properties: Grayish-white.
Constants: Melting range 173° to 175°C.
Soluble in alcohol.
Derivation: From meta-tolylenediamine.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Digallic Acid. See Tannic acid.

Dighton Artificial Gum. Proprietary name for a gum used for weighting and finishing textiles.

Digitalin $C_{35}H_{56}O_{14}$.
Color and properties: Coarsely granular, crystalline glucoside; poisonous!
Constants: M.p.: Decomposes above 235°C. without melting.
Soluble in a mixture of alcohol and chloroform; slightly soluble in water and alcohol.
Derivation: From digitalis.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine (similar to digitalis).
Railroad shipping regulations: None.*

Digitalis (Fox-glove; Purple fox-glove; Fairy gloves).
Dried leaves of Digitalis purpurea.
Habitat: Southern and central Europe; cultivated in the United States.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine (stimulant in acute circulatory failure, as a diuretic, and as a cardiac tonic).
Railroad shipping regulations: None.*

Digitoxin $C_{28}H_{46}O_{10}$.
Color and properties: White, crystalline glucoside; poisonous!
Soluble in alcohol, chloroform and a mixture of glycerol, alcohol and water; slightly soluble in water and ether.
Derivation: By extraction from digitalis.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (similar to digitalis).
Railroad shipping regulations: None.*

Dihydrated Telluric Hydroxide. See Telluric acid.

Dihydromorphine Hydrochloride. See Para-morphan.

1:2-Dihydroxyanthraquinone. See Alizarin.

1:4-Dihydroxyanthraquinone. See Quinazarin.

1:5-Dihydroxyanthraquinone (Anthrarufin) $C_{14}H_6O_2(OH)_2$.
Color and properties: Yellow, crystalline tablets.
Constants: M.p. 280°C.
Soluble in alcohol; very sparingly soluble in water.
Derivation: By heating anthraquinone with boric acid and sulfuric anhydride.
Method of purification: Crystallization.
Impurities: 1:8-Dihydroxyanthraquinone.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes.
Railroad shipping regulations: None.*

1:8-Dihydroxyanthraquinone (Chrysazin) $C_{14}H_6O_2(OH)_2$.
Color and properties: Reddish-brown needles.
Constants: M.p. 191°C.
Soluble in alcohol; sparingly soluble in water.
Derivation: From 1:8-dinitroanthraquinone by reduction and subsequent diazotization.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes.
Railroad shipping regulations: None.*

Dihydroxybenzenehexamethylenetetramine. See Hetralin.

Dihydroxybenzene, Meta-. See Resorcinol.

Dihydroxybenzene, Ortho-. See Pyrocatechol.

Dihydroxybenzene, Para-. See Hydroquinone.

Dihydroxycodeinone Hydrochloride. See Eucodal.

Dihydroxydiaminomercurobenzene $OHNH_2C_6H_3HgC_6H_3OHNH_2$.
A mercury compound analogous to salvarsan (q.v.), used in medicine as a germicide and a source of mercury. Unofficial.
Railroad shipping regulations: None.*

5:5-Dihydroxy-7:7-disulfonic-2:2-dinaphthylamine (Rhoduline acid).
Color and properties: Buff.
Soluble in alkaline solutions.
Derivation: From J acid.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

5:5-Dihydroxy-7:7-disulfonic-2:2-dinaphthylurea (J acid urea).
Color and properties: (Crude) light gray paste.
Soluble in water, very soluble in alkaline solution.
Derivation: Phosgenation of J acid.
Method of purification: None.
Grades: Crude.
Containers: Wooden barrels.
Uses: Azo colors.
Railroad shipping regulations: None.*

1:2-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: Silvery plates.
Constants: M.p. 60°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By reduction of beta-naphthoquinone with sulfurous acid.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

1:3-Dihydroxynaphthalene (Naphthoresorcinol) $C_{10}H_6(OH)_2$.
Color and properties: Transparent, crystalline plates.
Constants: M.p. 124°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By heating naphthalene-1:3-disulfonic acid with dilute acids at 230°C. under pressure.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

1:5-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: White needles.
Constants: M.p. 260°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By fusing naphthalene-1:5-disulfonic acid with caustic soda.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

1:6-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: White crystalline plates.
Constants: M.p. 136°C.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By fusing naphthalene-1:6-disulfonic acid with caustic soda.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

1:7-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: Fine white needles.
Constants: M.p. 158°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By fusing naphthalene-1:7-disulfonic acid with caustic soda.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

1:8-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: White needles or plates.
Constants: M.p. 138°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: From naphthosulfone by fusion with caustic soda.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

2:3-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: Colorless crystals.
Constants: M.p. 160°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: From 2-naphthol-3:6-disulfonic acid by fusion with caustic soda.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

2:6-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: White, crystalline plates.
Constants: M.p. 216°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: From 2-naphthol-6-sulfonic acid by fusion with caustic soda.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

2:7-Dihydroxynaphthalene $C_{10}H_6(OH)_2$.
Color and properties: Long, white, crystalline needles or plates.
Constants: M.p. 186°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: From 2-naphthol-7-sulfonic acid by fusion with caustic soda.
Grades: Technical.
Containers: Wooden casks.
Uses: Dyes.
Railroad shipping regulations: None.*

Dihydroxyphthalophenone. See Phenolphthalein.

Dihydroxystearic Acid (Dioxystearinic acid; dioxystearic acid) $C_{17}H_{33}(OH)_2COOH$.
Color and properties: White crystals.
Constants: M.p. 135°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating dibromide of isoöleic acid with silver oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Stearic acid compounds; cosmetic and toilet preparations.
Railroad shipping regulations: None.*

Dihydroxysuccinic Acid. See Tartaric acid.

Dihydroxytriphenylcarbinolcarboxylic Acid Anhydride. See Phenolphthalein.

Diïodoaniline (Meta-diïodoaniline) $C_6H_3I_2NH_2$.
Color and properties: Shining, brown crystals.
Constants: M.p. 96°C.
Soluble in alcohol, ether, chloroform, acetic ether and carbon bisulfide; insoluble in water.
Derivation: By the action of iodine chloride on acetanilide, followed by saponification and distillation with steam.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Diïodobrassidinic Acid Ethyl Ester. See Lipoiodine.

Diïododithymol. See Thymol iodide.

Diïodoform (Ethylene tetraïodide; Ethylene periodide; Iodoethylene; Iodethylene) C_2I_4.
Color and properties: Fine, yellow, odorless needles.
Constants: M.p. 187°C.
Soluble in chloroform, benzene, toluene and carbon bisulfide; slightly soluble in alcohol and ether; insoluble in water.
Derivation: From acetylene iodide with an excess of iodine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Diïodomethane. See Methylene iodide.

Diïodomethylsalicylate. See Sanoform.

Diïodo-para-phenolsulfonic Acid. See Iodozol.

1:3-Diïodopropane-2-ol. See Iothion.

Diïsobutyl-ortho-cresol Iodide. See Europhen.

Dijer's Saffron. See Carthamus.

Dilem-leaf Oil.
Color and properties: Thick liquid, yellowish-green oil; patchouli-like odor.
Constants: Sp.gr. 0.962; b.p. 250° to 300°C.
Soluble in alcohol, ether, benzene and chloroform.
Derivation: Distilled from a Javanese plant, the botanical origin of which is unknown.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Perfumery.
Railroad shipping regulations: None.*

Dill. See Anethum.

Dill Oil (Anethum oil).
Color and properties: Pale yellow, volatile, essential oil; characteristic penetrating odor; sweetish taste, rapidly becoming sharp and burning.
Chief known constituents: Limonene and carvone.
Constants: Sp.gr. 0.895 to 0.915; optical rotation +70° to +80°.
Soluble in alcohol, ether, benzene and chloroform.
Derivation: Distilled from the fruit of Anethum graveolens.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Flavoring agent; perfumery.
Railroad shipping regulations: None.*

Dill Seed. See Anethum.

Dilver. See Ferronickel alloys.

Dimagnesium Ortho-phosphate. See Magnesium phosphate.

Dimagnesium Phosphate. See Magnesium phosphate.

Dimethylacetal (Ethylidenedimethyl ether) $CH_3(OCH_3)_2CH$.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Colorless, inflammable liquid; strongly aromatic odor.
Constants: Sp.gr. 0.879; b.p. 62° to 63°C.
Soluble in water, alcohol, ether and chloroform.
Derivation: By heating aldehyde with methyl alcohol and glacial acetic acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Medicine; organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Dimethyl-alpha-naphthylamine $C_{10}H_7N(CH_3)_2$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 1.045; b.p. 275°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: Action of methylsulfate on alpha-naphthylamine.
Method of purification: Fractional distillation.
Grades: C.P.; analytical.
Containers: Glass bottles.
Uses: Determination of nitrites.
Railroad shipping regulations: None.*

Dimethylamine $(CH_3)_2NH$.
Color and properties: Light-colored liquid.
Constants: B.p. 7.2° to 7.3°C.
Soluble in water, alcohol and ether.
Derivation: Nitrosation and hydrolysis of dimethylaniline.
Method of purification: None.
Grades: Technical.
Containers: Drums.
Uses: Intermediates.
Fire hazard: Probably dangerous.*
Railroad shipping regulations: Red label(?)*

Dimethylamino-alpha-beta-dimethylpropyl-para-aminobenzoate Hydrochloride, Gamma-. See Tutocain.

Dimethylaminoantipyrine. See Pyramidone.

Dimethylaminoantipyrinebutylchloralhydrate. See Trigemin.

Dimethylaminoazobenzene (Dimethylaminoazobenzol; Benzeneazodimethylaniline; Butter yellow) $C_6H_5NNC_6H_4N(CH_3)_2$.
Color and properties: Golden-yellow crystalline leaflets.
Constants: M.p. 116°C.
Soluble in water, alcohol, ether, strong mineral acids and oils.
Derivation: A solution of aniline hydrochloride is diazotized, then added to a solution of dimethylaniline in dilute hydrochloric acid and precipitated by a concentrated solution of sodium acetate.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Coloring butter; indicator in volumetric analysis.
Railroad shipping regulations: None.*

Dimethylaminoazobenzene Sulfonate (Sulfobenzeneazodimethylaniline) $SO_3HC_6H_4N_2C_6H_4N(CH_3)_2$.
Color and properties: Violet crystals or powder.
Soluble in alcohol; slightly soluble in water.
Derivation: By the sulfonation of dimethylaminoazobenzene.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Manufacturing helianthin and related dyes.
Railroad shipping regulations: None.*

Dimethylaminoazobenzol. See Dimethylaminoazobenzene.

Dimethylaminobenzaldehyde, Para- $C_6H_4(N(CH_3)_2)CHO$.
Color and properties: Colorless crystalline plates.
Constants: M.p. 73°C.
Soluble in hot water, alcohol and ether.
Derivation: By mixing dimethylaniline, anhydrous chloral and phenol and allowing the mixture to stand. The phenol is removed by shaking with dilute caustic soda and the residue dissolved in water and hydrochloric acid and crystallized.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Dimethylaminoethylpropylbenzoate Hydrochloride. See Stovaine.

Dimethylaniline $C_6H_5N(CH_3)_2$.
Color and properties: Yellowish to brownish oily liquid.
Constants: Sp.gr. 0.954; m.p. 2.5°C.; b.p. 192.5° to 193.5°C.
Soluble in alcohol and ether.
Derivation: By heating a mixture of aniline, aniline hydrochloride and methyl alcohol (free from acetone) in an autoclave and distilling.
Method of purification: Rectification.
Grades: Technical.
Containers: 450, 850 lb. iron drums.
Uses: Dyes; intermediates.
Railroad shipping regulations: None.*

Dimethylarsenic Acid. See Cacodylic acid.

Dimethylbenzene, Meta-, Ortho-, Para-. See corresponding xylene.

Dimethylbenzol. See Xylene.

Dimethylbenzylcarbinol.
Isomeric with phenylpropyl alcohol.
Color and properties: Colorless or yellowish liquid, odor of hyacinth or lilac.
Uses: Perfumery.
Railroad shipping regulations: None.*

Dimethyl-beta-naphthylamine $C_{10}H_7N(CH_3)_2$.
Color and properties: Crystalline solid.
Constants: Sp.gr. 1.008; m.p. 46°C.; b.p. 305°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of dimethylamine and beta-naphthol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

2:2-Dimethyl-1:1-dianthraquinonyl $C_{30}H_{18}O_4$.
Color and properties: Yellow crystals.
Constants: M.p. 365° to 367°C.
Soluble in hot nitrobenzene, aniline and chlorobenzene.
Derivation: 1-Amino-2-methylanthraquinone is dissolved in sulfuric acid and sodium nitrite is added. The isolated and dried diazonium sulfate is stirred into acetic anhydride and copper powder added. Nitrogen is evolved and the combination takes place, forming the dianthraquinonyl derivative.
Method of purification: Crystallization from solvents in which it is soluble.
Uses: Dyes.
Railroad shipping regulations: None.*

Dimethyldiphenylurea (Zentralin) $(CH_3)_2(C_6H_5)_2CON_2$.
Color and properties: White crystals.
Constants: M.p. 120°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: By saturation of monomethylaniline with carbonyl chloride, removal of benzene by distillation, washing the residue with acid water and crystallizing from alcohol. The crystals are warmed with alcoholic ammonia, diluted with water to precipitate, washed with water, dissolved in alcohol and crystallized.
Method of purification: Recrystallization.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Stabilizer for smokeless powder, explosives and nitro-compounds.

Railroad shipping regulations: None.*

Dimethylethylcarbinol. See Amyl alcohol, tertiary.

Dimethylglyoxime (Butane dioxime; Alpha-dimethylglyoxime) $(CH_3)_2C_2(NOH)_2$.

Color and properties: White crystals.

Constants: M.p. 232° to 233°C.

Soluble in alcohol and ether; very slightly soluble in water.

Derivation: (a) By methylating glyoxime which is prepared from glyoxal and hydroxylamine. (b) Sulfur dioxide gas is passed into mixed, supersaturated, cooled solutions of sodium sulfite and nitrite until a water-white solution results. This is warmed on a steam bath for a few hours, cooled and a mixture of ethylmethylketone and ethyl nitrite added, with constant stirring, yielding a curdy precipitate. This is stirred until converted into a mass of crystals. (c) Nitrosomethylethyl ketone is prepared from methylethyl ketone, amyl nitrite and hydrochloric acid and is extracted from the reaction mixture with sodium hydroxide solution under continuous stirring and separation of the amyl alcohol formed. The solution is neutralized with more sodium hydroxide, if necessary, and heated with a freshly prepared hydroxylamine sulfate solution, yielding dimethylglyoxime. The solution is filtered hot, the dimethylglyoxime washed with hot water, dried and crystallized.

Method of purification: Recrystallization.

Grades: Technical; C.P.

Containers: Tins; glass bottles.

Uses: Analytical chemistry, especially as a reagent for nickel.

Railroad shipping regulations: None.*

Dimethylglyoxime, Alpha-. See Dimethylglyoxime.

Dimethylketal. See Acetone.

Dimethylketone. See Acetone.

Dimethylnitrobenzene. See Nitroxylene.

Dimethylnitrobenzol. See Nitroxylene.

Dimethyl-para-phenylenediamine (Para-aminodimethylaniline) $C_6H_4NH_2N(CH_3)_2$.

Color and properties: Brown, crystalline mass.

Constants: M.p. 41°C.; b.p. 257°C.

Soluble in water, alcohol, ether and benzene.

Derivation: A solution of sodium nitrite is slowly run into a solution of dimethyaniline in hydrochloric acid and water mixed with chopped ice. The nitrosodimethylaniline is reduced with zinc dust. It is then filtered and the filtrate, after concentration, is mixed with caustic soda and extracted with benzene and crystallized.

Method of purification: Recrystallization.

Grades: Technical.

Containers: Wooden barrels.

Uses: Dyes.

Railroad shipping regulations: None.*

Dimethylphenylpyrazolone Mercury Sulfaminate. See Argulan.

Dimethylpiperazine. See Lupetazine.

Dimethylpiperazine Tartrate. See Lycetol.

Dimethyl Sulfate (Methyl sulfate) $(CH_3)_2SO_4$.

Color and properties: Colorless liquid; very poisonous!

Constants: Sp.gr. 1.3516; m.p. —10°C.; b.p. 188°C.

Soluble in alcohol; very slightly soluble in water.

Derivation: By adding fuming sulfuric acid to methyl alcohol and distilling in vacuo.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums in wooden crates.

Uses: Methylating agent for amines and phenols; military poison gas in the late war.

Railroad shipping regulations: White label.

Dimethyl Sulfide. See Methyl sulfide.

Dimethyltrithiocarbonate $CS_3(CH_3)_2$. A military poison gas used in the late war.

1:3-Dimethylxanthine. See Theophylline.

3:7-Dimethylxanthine. See Theobromine.

N:N-Di-2-naphthyl-meta-phenylenediamine $C_6H_4(NHC_{10}H_7)_2$.

Color and properties: Colorless needles.

Constants: M.p. 191°C.

Sparingly soluble in alcohol; insoluble in water and ether.

Derivation: By heating meta-phenylenediamine with beta-naphthol and subsequent extraction with alcohol.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs.

Uses: Organic synthesis.

Railroad shipping regulations: None.*

Dinitroaminophenol. See Picramic acid.

Dinitroaniline $C_6H_3NH_2(NO_2)_2$.

Color and properties: Yellow crystals.

Constants: Sp.gr. 1.615; m.p. 187.5° to 188°C.

Slightly soluble in alcohol, insoluble in water.

Derivation: By the nitration of para-nitroaniline with hot mixed acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden barrels.

Uses: Organic synthesis.

Railroad shipping regulations: None.*

Dinitrobenzene (Dinitrobenzol) $C_6H_4(NO_2)_2$.

Color and properties: Yellow crystals.

Constants:	Meta-	Ortho-	Para-
Specific gravity	1.546	1.565	1.587
Melting-point	89.9°C.	117.9°C.	372° to 373°C.
Boiling-point	302.8°C.	319°C.	299°C.

Soluble in alcohol; slightly soluble in water.

Derivation: By nitration of nitrobenzene with hot mixed acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: 5, 25, 50, 100 lb. drums.

Uses: Organic synthesis; dyes.

Railroad shipping regulations: None.*

Dinitrobenzol. See Dinitrobenzene.

Dinitrobenzyldisulfonic Acid $(CH_2C_6H_3SO_3HNO_2)_2$.

Color and properties: Colorless plates or tablets.

Soluble in water, alcohol and ether.

Derivation: By the oxidation of sodium para-nitrotoluene sulfonate with sodium hypochlorite in an excess of caustic soda.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs.

Uses: Organic synthesis; dyestuffs.

Railroad shipping regulations: None.*

Dinitrochlorobenzene (Dinitrochlorobenzol) $C_6H_3(NO_2)_2Cl$.

Color and properties: Colorless needles.

Constants: Sp.gr. 1.69; m.p. 37.1° to 53°C.

Soluble in alcohol; insoluble in water.

Derivation: By the chlorination of dinitrobenzene.

Method of purification: Crystallization.

Grades: Technical.

Containers: 700, 1,400 lb. drums.

Uses: Dyes; organic synthesis.

Railroad shipping regulations: None.*

Dinitrochlorobenzol. See Dinitrochlorobenzene.

2:4-Dinitro-4-hydroxydiphenylamine $(NO_2)_2C_6H_4NHC_6H_4OH$.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Yellow.
Constants: M.p. 190°C.
Insoluble in water.
Derivation: Condensation of 2:4-dinitro-1-chlorobenzene and para-aminophenol.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Barrels.
Uses: Sulfur colors.
Railroad shipping regulations: None.*

Dinitronaphthalene $C_{10}H_6(NO_2)_2$ (a) 1:5- (b) 1:8-.
Color and properties: (a) Yellowish-white needles; (b) Yellowish-white, thick, crystalline tablets.
Constants: M.p. (a) 217°C.; (b) 172°C.
(a) Sparingly soluble in pyridine; (b) Soluble in pyridine.
Derivation: By dissolving alpha-nitronaphthalene in sulfuric acid and adding nitric acid. The solution is heated to 80° to 90°C. and cooled.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes, especially sulfur colors; intermediates.
Railroad shipping regulations: None.*

Dinitrophenol (Alpha-dinitrophenol)
$C_6H_3OH(NO_2)_2$ (a) 2:3-; (b) 2:4-; (c) 2:6-.
Color and properties: Yellow crystalline tablets.
Constants:

	(a)	(b)	(c)
Specific gravity	....	1.683	....
Melting-point	144°C.	114° to 115°C.	61.78°C.

Soluble in alcohol and ether; slightly soluble in water.
Derivation: (a) By heating phenol with dilute sulfuric acid, cooling the product, and then nitrating, keeping the temperature below 50°C. (b) By nitration with mixed acid with very careful temperature control.
Method of purification: Crystallization.
Grades: Technical.
Containers: Paraffin-lined wooden barrels.
Uses: Dyes, especially sulfur colors; picric acid; picramic acid; conservation of lumber timbers and poles; starting point in the manufacture of the photographic developer amidol.
Fire hazard: Dangerous. None when wet.*
Railroad shipping regulations: None.*

Dinitrophenol, Alpha-. See Dinitrophenol.

Dinitrophenol (Sodium Salt) $C_6H_3(NO_2)_2ONa$.
Color and properties: Red needles plus $3H_2O$.
Soluble in water.
Derivation: From dinitrochlorobenzene by treating with caustic soda.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Kegs or barrels.
Uses: Sulfur and azo dyes.
Fire hazard: Explosive.*
Railroad shipping regulations: Special regulations to be made(?)*

3:5-Dinitrosalicylic Acid $C_6H_2(OH)(NO_2)_2COOH$.
Color and properties: Yellow crystals.
Constants: M.p. 174°C.
Slightly soluble in water; soluble in alcohol and benzene.
Derivation: Nitration of salicylic acid.
Method of purification: Recrystallization.
Grades: C.P.
Containers: Glass bottles.
Uses: Determination of glucose.
Railroad shipping regulations: None.*

Dinitrostilbene Disodium Sulfonate
$NaSO_3NO_2C_6H_4CHHCH_4C_6NO_2NaSO_3$.
Color and properties: Yellow crystals.
Constants: M.p.: Decomposes.
Very soluble in hot water; moderately soluble in cold water and slightly soluble in alcohol and ether.
Derivation: Condensation of para-acid in caustic soda solution with oxidation by means of sodium hypochlorite.
Method of purification: Not purified.
Grades: Technical.
Containers: 50 gal. oak barrels.
Uses: Reduced to diaminostilbene which is used as intermediate for brilliant paper yellow which in turn is ethylated to give Pontamine yellow CH. Used directly in the formation of Pontamine fast orange EG.
Railroad shipping regulations: None.*

Dinitrotoluene (Dinitrotoluol)
$C_6H_3CH_3(NO_2)_2$ (a) 2:4-; (b) 3:4-; (c) 3:5-.
Color and properties: Yellow crystals.
Constants:

	(a)	(b)	(c)
Specific gravity	1.3208	1.32	....
Melting-point	70.5°C.	61°C.	2.3°C.

Soluble in alcohol and ether; insoluble in water.
Derivation: By nitration of nitrotoluene with hot nitrosulfuric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: 300 lb. wooden barrels.
Uses: Organic syntheses; toluidines; tolidines; dyes; explosives.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Dinitrotoluol. See Dinitrotoluene.

Diogenal (Dibromopropyldiethylbarbituric acid)
$C_{11}H_{16}O_3N_2Br_2$.
Color and properties: White crystalline powder. Stated to be only about one-fourth as toxic as barbital.
Soluble in alkaline solutions and alcohol; almost insoluble in water.
Uses: Medicine (sedative, somnifacient, unofficial).
Railroad shipping regulations: None.*

Dionin (Ethylmorphine hydrochloride)
$C_{17}H_{18}O_2N(OC_2H_5)HCl.2H_2O$.
Color and properties: White crystalline powder; poisonous!
Constants: M.p. 125°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: Action of hydrochloric acid on ethylmorphine which is made by action of ethyl iodide on morphine in alkaline solution.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine (relieve cough or pain, analgesic).
Railroad shipping regulations: None.*

Diopside $CaMg(SiO_3)_2$.
A natural calcium-magnesium silicate. Color, white ranging to pale green or nearly black.
Constants: Sp.gr. 3.2 to 3.38.
Occurrence: United States, Italy, Switzerland, Austria, Germany, Hungary, Russia, Siberia, Finland, Sweden.

Diorite. A granitoid rock composed essentially of hornblend and feldspar which is mostly or wholly plagioclase, with accessory biotite and (or) augite. Minute grains of magnetite and titanite may be visible. Quartz may be present in considerable amount, in which case the rock is called quartz diorite. Quarried for crushed rock in the District of Columbia, Virginia and many other states.

Di-ortho-tolyguanidine $CH_3C_6H_4NCNH_2NHCH_3C_6H_4$.
Color and properties: White powder; non-hygroscopic; non-toxic.
Constants: Sp.gr. 1.10; m.p. 179°C.
Very slightly soluble in water; soluble in warm alcohol from which it crystallizes on cooling.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Desulfurization of di-ortho-tolylthiourea with a lead compound in the presence of ammonia.
Uses: Rubber accelerator.
Railroad shipping regulations: None.*

Dioscorea (Wild yam root).
Dried rhizome of Dioscorea villosa, native to North America (Virginia, North Carolina, Indiana, Michigan). Used in medicine, with doubtful value.

Dioscorein. Bitter brown powder, soluble in alcohol. A resinoid obtained from dioscorea, used in medicine as an expectorant and diuretic.

Diosma. See Buchu.

1:4-Dioxan. See Diethylene oxide.

Dioxyanthraquinones. See Dihydroxyanthraquinones.

Dioxybenzenes. See Dihydroxybenzenes.

Dioxybenzene, Meta-. See Resorcinol.

Dioxymethylanthraquinone. See Chrysarobin.

Dioxynaphthalenes. See Dihydroxynaphthalenes.

Dioxystearic Acid. See Dihydroxystearic acid.

Dioxystearinic Acid. See Dihydroxystearic acid.

Dioxytriphenylphthalide. See Phenolphthalein.

Dip Oil. A 25% crude carbolic acid used to manufacture cattle-dips and disinfectants.

Di-para-aminodimethoxydiphenyl. See Dianisidine.

Di-para-aminoethoxydiphenyl. See Ethoxybenzidine.

Di-para-anisyl-para-phenetylguanidine Hydrochloride (Acoine; Guanicaine) $CNC_6H_4OC_2H_5(NHC_6H_4OCH_3)_2.HCl$.
Color and properties: White crystalline powder; incompatible with iodine and alkaline iodides.
Constants: M.p. 176°C.
Uses: Medicine (local anesthetic, especially used by ophthalmologists and dentists, and in nasal operations, unofficial).
Railroad shipping regulations: None.*

1:3-Di-para-tolyl-meta-phenylenediamine $C_6H_4(NHC_7H_7)_2$.
Color and properties: Long needles.
Constants: M.p. 137°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating resorcinol and para-toluidine in presence of zinc chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

2:7-Di-para-tolylnaphthalenediamine $C_{10}H_6(NHC_7H_7)_2$.
Color and properties: Fine needles.
Constants: M.p. 237°C.
Sparingly soluble in alcohol; insoluble in water.
Derivation: By heating 2:7-dihydroxynaphthalene with para-toluidine and para-toluidine hydrochloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden boxes.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Dipentene (Diamylene; Cinene; Inactive limonene; Dipentine; Cajeputene; Kautschin) $C_{10}H_{16}$.
Color and properties: Colorless liquid; pleasant, lemon-like odor.
Constants: Sp.gr. 0.85; b.p. 181° to 182°C.
Miscible with alcohol; insoluble in water.
Derivation: From various ethereal oils, particularly Levant wormseed oil.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Extracts.
Railroad shipping regulations: None.*

Dipenteneglycol. See Terpine hydrate.

Dipentine. See Dipentene.

Diphenyl $C_6H_5C_6H_5$.
Color and properties: White scales; pleasant odor.
Constants: Sp.gr. 0.9845; m.p. 70°C.; b.p. 255°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By slowly passing benzene through a red hot iron tube. (b) By heating bromobenzene and sodium, with subsequent distillation.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diphenylamine (Phenylaniline) $(C_6H_5)_2NH$.
Color and properties: Colorless to grayish crystals.
Constants: Sp.gr. 1.159; m.p. 52.85°C.; b.p. 310°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By heating equal formula weights of aniline and aniline hydrochloride in an autoclave. The product is boiled with dilute hydrochloric acid to remove the unaltered aniline, and the residue is distilled.
Method of purification: Crystallization.
Grades: Technical.
Containers: 350 lb. barrels.
Uses: Organic synthesis; dyes.
Railroad shipping regulations: None.*

Diphenylbenzidine $C_6H_5HNC_6H_4C_6H_4NHC_6H_5$.
Color and properties: White powder.
Constants: M.p. 242°C.
Insoluble in water; slightly soluble in alcohol and aromatic hydrocarbons.
Derivation: Diphenylamine and fuming sulfuric acid.
Method of purification: Recrystallization.
Grades: C.P.; analytical.
Containers: Glass bottles.
Uses: Determination of zinc and nitrites.
Railroad shipping regulations: None.*

Diphenylcarbazide $(C_6H_5NHNH)_2CO$.
Color and properties: White crystals.
Constants: M.p. 173°C.
Insoluble in water; soluble in alcohol and benzene.
Derivation: Phenylhydrazine on urea.
Method of purification: Recrystallization.
Grades: C.P.
Containers: Glass bottles.
Uses: Determination of copper.
Railroad shipping regulations: None.*

Diphenylchloroarsine (Blue cross gas) $(C_6H_5)_2AsCl$. A military poison gas used in the late war.

Diphenylendoanilohydrotriazole. See Nitron.

Diphenylenemethane, Alpha-. See Fluorene.

Diphenylenemethane Oxide. See Xanthine.

Diphenylenethylene, Ortho-. See Phenanthrene.

Diphenylethylene. See Stilbene.

Diphenylcyanoarsine $(C_6H_5)_2AsCN$. A military poison gas used in the late war.

Diphenylguanidine $NHCH(C_6H_5NH)$.
Color and properties: White crystalline powder.
Constants: Sp.gr. 1.13; m.p. 147°C.
Derivation: Treatment of aniline with cyanogen chloride.
Method of purification: Recrystallization.
Grades: Technical.
Containers: 100 lb. galvanized iron drums.
Uses: Acceleration of rubber vulcanization.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Diphenylimide. See Carbazole.

Diphenylketone. See Benzophenone.

N:N-Diphenyl-meta-phenylenediamine $C_6H_4(NHC_6H_5)_2$.
Color and properties: Flat crystalline needles.
Constants: M.p. 95°C.
Soluble in hot alcohol; insoluble in water.
Derivation: By heating resorcinol with aniline in presence of calcium chloride and zinc chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diphenylmethane (Benzylbenzene) $(C_6H_5)_2CH_2$.
Color and properties: Long colorless needles.
Constants: Sp.gr. 1.0056; m.p. 26.5°C.; b.p. 264.7°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By condensation of benzyl chloride and benzene in presence of aluminum chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron barrels.
Uses: Organic synthesis; dyes; perfumery.
Railroad shipping regulations: None.*

Diphenylnaphthylenediamine $C_{10}H_6(NHC_6H_5)$.
Color and properties: Silvery, crystalline plates.
Constants: M.p. 164°C.
Slightly soluble in alcohol; insoluble in water.
Derivation: By heating 2:7-dihydroxyoxynaphthalene with aniline and aniline hydrochloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diphenyl Oxide $(C_6H_5)_2O$.
Color and properties: Colorless crystals, geranium odor.
Constants: Sp.gr. 1.0728; m.p. 27°C.; b.p. 259°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the reaction of bromobenzene and sodium phenate heated under pressure.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1, 5, 10 lb. cans or bottles; 50 lb. carboys; 100, 250, 500 lb. drums.
Uses: Organic synthesis; perfumery, particularly for soaps.
Railroad shipping regulations: None.*

Diphenylurea (Carbanilide) $(NHC_6H_5)CO(NHC_6H_5)$.
Color and properties: Colorless prisms.
Constants: M.p. 235°C.; b.p. 260°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: From aniline and phenylcyanate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diphosgene. See Trichloromethylchloroformate.

Diplosal. See Salicylic acid, salicylic ester.

Dipotassium Ortho-phosphate. See Potassium phosphate, dibasic.

Dippel's Oil. See Bone oil.

Dipping Acid. See Sulfuric acid.

Dipropylbarbituric Acid (Propal; Proponal). $(C_3H_7)_2C(CONH)_2CO$.
Color and properties: Colorless crystals; more powerful and rapid somnifacient than barbital but not so reliable.
Constants: M.p. 145°C.
Soluble in dilute alkalis; sparingly soluble in cold water, more so in hot water.
Uses: Medicine (similar to barbital).
Railroad shipping regulations: None.*

Dipropylenediamine. See Lupetazine.

Dipropylmethane. See Heptane.

Dipterix. See Tonka.

Diquinine Carbonic Ester. See Aristochin.

Diresorcinol (Tetroxydiphenyl) $(OH)_2C_6H_3{:}C_6H_3(OH)_2$.
Color and properties: White crystalline powder.
Constants: M.p. 310°C.
Soluble in hot water and alcohol.
Derivation: By fusing resorcinol and phenol with caustic soda.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Diresorcinolphthalein. See Fluorescein.

Discharging Agents. Substances capable of destroying a dye or mordant present within the fibers of a fabric. There are various methods of utilizing this property so that it is possible to finally produce a colorless figure upon a colored ground or a colored figure upon a differently colored ground.

Disodiumhydroxymercurisalicyloxyacetate. See Mercurosal.

Disodium Methyl Arsenate (Arrhenal; Arsynal; Neoarsycodile; Stenosine) $OAsCH_3O_2Na_2 \cdot 5H_2O$.
Color and properties: Crystalline powder containing 27.37% arsenic; does not impart a garlic odor.
Soluble in water; somewhat soluble in alcohol.
Uses: Medicine (similar to sodium cacodylate, unofficial).
Railroad shipping regulations: None.*

Disodium Ortho-phosphate. See Sodium phosphate, dibasic.

Disodium Phosphate. See Sodium phosphate, dibasic.

Disodium Pyrophosphate. See Sodium phosphate, pyro-.

Dispargen.
A colloidal silver preparation containing 30% silver and using a decomposition product of glutin as the protective colloid. Used in medicine as an antibacterial. Unofficial.
Railroad shipping regulations: None.*
See also Silver, colloidal.

Disthene. See Cyanite.

Disulfuric Acid. Fuming sulfuric acid (q.v.).

Ditaine (Echitamine) $C_{22}H_{28}N_2O_4 \cdot 4H_2O$.
Color and properties: White, thick, glistening, crystalline alkaloid; poisonous!
Constants: M.p. 206°C.
Soluble in water and alcohol; very slightly soluble in ether.
Derivation: By extraction from the bark of Alstonia scholaris.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ditch Powder.
A low-grade dynamite containing approximately 10% nitroglycerin absorbed in a finely ground mixture of coal, sulfur, sodium nitrate, rosin or similar materials.
Uses: Loosening masses of earth as in railroad excavation or farm ditching.
Railroad shipping regulations: High explosive.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Dithion (Sodium dithiosalicylate) $(NaOOCOHC_6H_3)_2S$. Two isomeric salts (Dithion I and Dithion II).
Color and properties: Yellowish-white, amorphous powder.
Soluble in water. Dithion I is insoluble in sodium chloride solution.
Uses: Medicine (Dithion I, antiseptic dusting powder; Dithion II, antirheumatic and antipyretic, unofficial).
Railroad shipping regulations: None.*

Dithymol Diïodide. See Thymol iodide.

Ditolylguanidine, Ortho-.
Color and properties: White powder.
Constants: M.p. 171°C. minimum.
Soluble in alcohol and hydrochloric acid.
Derivation: From ortho-toluidine.
Method of purification: May be purified by recrystallization from alcohol.
Grades: Technical.
Containers: Drums.
Uses: Vulcanization of rubber.
Railroad shipping regulations: None.*

Ditolylthiourea, Ortho- $SC(NHC_6H_4CH_3)_2$.
Color and properties: Colorless, crystalline leaflets; pungent odor; not hygroscopic.
Constants: M.p. 144° to 148°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: By the interaction of ortho-toluidine and carbon bisulfide.
Grades: Technical.
Containers: Drums.
Uses: Rubber vulcanization accelerator.
Railroad shipping regulations: None.*

Ditolylthiourea, Para- $SC(NHC_6H_4CH_3)_2$.
Color and properties: White powder.
Soluble in ether; slightly in alcohol.
Derivation: From para-toluidine.
Method of purification: May be recrystallized from the above solvents.
Railroad shipping regulations: None.*

Diuretin. See Theobromine sodium salicylate.

Divale. See Belladonna.

Divanadyl Tetrachloride. See Vanadium chloride.

Divi Divi.
Derivation: The fruit of a West Indian tree, Caesalpinia copiaria. Forms very thin pods about 3 inches in length.
Grades: Technical (pods; extract).
Containers: Pods: 100,200 lb. and various size burlap bags; extract: 450-500 lb. barrels.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Divine Stone. See Copper, aluminated.

"Dixie" Black. See under Blacks.

Djamboë. See Guava.

Dobbins Reagent.
A reagent used as a test for caustic alkalis in soap.
Preparation: Mercuric chloride solution is added to potassium iodide solution until a permanent precipitate is obtained. The solution is filtered and 1 gram of ammonium chloride added. Dilute sodium hydroxide is then added until a precipitate is formed. The solution is filtered and made up to 1 liter.

Doctor Gum. See Hog gum.

Dog Button. See Nux vomica.

Dog-fish Oil. See Shark oil.

Dog-grass. See Triticum.

Dog-tooth Spar. See Calcite.

Dogbane. See Apocynum.

Dogwood (Cornus; Flowering dogwood).
Derivation: Root bark of dogwood tree Cornus florida.
Habitat: Eastern and central United States and Ontario.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine; weak aromatic.
Railroad shipping regulations: None.*

Dolomite.
A term commonly applied to dolomite spar and dolomite rock.
Dolomite spar: A double salt of calcium and magnesium carbonates corresponding to the formula $CaCO_3 . MgCO_3$. Contains 54.28% $CaCO_3$, 45.72% $MgCO_3$.
Dolomite rock: A rock of indefinite character. It may consist of a mixture of calcite (q.v.), carbonates of iron and manganese, iron oxide and hydroxide, argillaceous matter and quartz with dolomite spar, with the calcium-magnesium ratio in the dolomite (spar) varying with a gradual increase in calcite (q.v.). There also may be some replacement of the magnesium carbonate by iron and manganese carbonate grading to ankerite (q.v.). Dolomitic or magnesian limestone is a term sometimes restricted to rocks intermediate between normal dolomite (spar) and limestone.
Uses: Substitute for magnesite (q.v.) in making basic linings in furnaces.

Dolomitic Limestone. See Limestone; also Dolomite.

Dolphin Oil. See Porpoise oil.

Donovan's Solution. Solution of arsenous and mercuric iodides.

Dopes. Pyroxylin solutions used principally for finishing leather and coating airplane fabrics.

Dormiol (Chloralamylene hydrate) $CCl_3CHOHO(CH_3)_2C_2H_5$.
Color and properties: Colorless, oily liquid; pungent mint and camphor odor; cooling pungent taste; decomposed by boiling water. Not miscible with cold water. Toxicity and incompatibilities approximately the same as that of chloral-hydrate.
Constants: Sp.gr. 1.24.
Soluble in alcohol, ether, acetone and fixed oils.
Derivation: Interaction of amylene hydrate with anhydrous chloral.
Uses: Medicine (hypnotic, unofficial).
Railroad shipping regulations: None.*

Double Manure Salt. See Potash magnesia double salt.

Double Superphosphate.
A product similar in appearance to super-phosphate (q.v.) but usually containing from two and one-half to three times as much available phosphoric acid.
Typical analysis: Available phosphoric acid 40 to 50%; insoluble phosphoric acid 0.5 to 4.0%; total phosphoric acid 42 to 52%; moisture 4 to 8%.
Derivation: By treating phosphate rock with phosphoric acid.
Uses: Fertilizer.
Note: This has recently been also called treble superphosphate.
Railroad shipping regulations: None.*

Douglas-fir Oil. See Pine-needle oils.

Dover's Powder.
Powdered ipecac and opium together with powdered milk sugar.
Grades: Technical; U.S.P.
Containers: Tins; glass bottles.
Uses: Medicine (diaphoretic, sedative).
Railroad shipping regulations: None.*

Dowco. Proprietary name for an insecticide. Stated to be a finely divided powder containing 12.75% metallic copper and 31.65% lead arsenate.

See paragraph 2, page 16 to paragraph 2, page 17 inclusive.

Containers: 54 lb. cases (40 1 lb. cans); 52 lb. cases (12 4 lb. bags); 112 lb. drums.
Uses: Insecticide and fungicide for potatoes, shrubs and all garden crops.
Railroad shipping regulations: Class B poison.

Dragon's Blood.
Color and properties: Deep red, amorphous lumps.
Chief known constituents: Dracoalban, dracoresene, draconine and esters.
Derivation: The resin from the surface of the fruit of several species of Daemonoraps; habitat: East Indies, Malay, Sumatra and Borneo.
Soluble in alcohol, ether and volatile and fixed oils.
Grades: According to source.
Containers: Tins; boxes.
Uses: Pigment; coloring plasters; lacquers; toothpowders; coloring marble and stoneware; tanning extract; furniture polishes; colored papers; coloring toilet preparations; process engraving and lithography; pharmaceuticals; varnishes; paints.
Railroad shipping regulations: None.*

Driers, Paint. The principal driers used in paint are lead, manganese and cobalt soaps, usually in the form of their resinates or linoleates; litharge; lead acetate; manganese dioxide; manganese borate.

Terebines, liquid driers, are solutions of some of the above metallic compounds in linseed oil and turpentine.

Some proprietary driers consist of any of the above reduced with inert fillers, such as barytes, whiting. The whole is ground in boiled oil. Too much drier is harmful to the paint, hence the use of filler.

Drop Black. See under Blacks, Animal black.

Drop Chalk. See Chalk, prepared.

Drosera (Sundew). Dried flowering carnivorous plant, Drosera rotundifolia.
Habitat: Europe, North America.
Grades: N.F.
Uses: Medicine (whooping cough).

Drumstick. See Cassia fistula.

Dryopteris. See Aspidium.

Dubb's Asphalt. See Sulfurized asphalts.

Duboisine. An alkaloid obtained from the leaves of Duboisia myoporoides, a tall shrub native to Australia, New South Wales and Queensland. Used in medicine (unofficial) in the form of the hydrochlorate or sulfate.

"Duclean." A compound which is stated to quickly and economically remove rust from the interior of iron drums. It will also remove scale from pipe systems and industrial equipment, such as evaporators, etc. Containers: 55 gal. drums.

Dufrenoysite. A natural sulfarsenide of lead, $Pb_2As_2S_5$. Found in Arizona and Idaho.

Dulcamara (Bittersweet).
Dried stem of climbing shrub, Solanum dulcamara.
Habitat: Europe, North America.
Grades: N.F.
Uses: Medicine (skin diseases).

Dulcin (Para-phenetolecarbamide; Sucrol) $CONH_2NHC_6H_4OC_2H_5$.
Color and properties: White, needle crystals or powder with taste about two hundred times as sweet as sugar.
Constants: M.p. 173° to 174°C.
Soluble in alcohol and ether; moderately soluble in hot water.
Derivation: From para-aminophenol.
Uses: Substitute for sugar; improve flavor of castor and cod-liver oils.
This substance should not be confused with dulcite (q.v.) which is sometimes called dulcin.
Railroad shipping regulations: None.*

Dulcite (Dulcitol; Melampyrit; Dulcin; Dulcose; Euonymit) $C_6H_8(OH)_6$.
Color and properties: White, glistening crystals; slightly sweet taste.
Constants: M.p. 188° to 189°C.
Soluble in water; slightly soluble in alcohol.
Derivation: A sugar from Melampyrum nemorosum.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Dulcitol. See Dulcite.

Dulcose. See Dulcite.

Dumortierite perhaps $8Al_2O_3.6SiO_2.B_2O_3.H_2O$.
A natural basic aluminum silicate. Bright, smalt-blue to greenish-blue in color. Vitreous luster.
Constants: Sp.gr. 3.26 to 3.36; hardness 7.
Occurrence: United States (New York, Arizona, Nevada), France, Silesia, Norway.
Uses: Extensively used in spark-plug porcelain; special refractories.

Duobels.
United States permissible explosives classified by the United States Bureau of Mines as follows: (See Explosives, permissible for explanation of classification.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
2 L.F.	A	I a
L.F.	A	I a

Railroad shipping regulations: High explosive.

Duotal. See Guaiacol carbonate.

Duraloy. Ferrous alloys containing in addition to iron the following percentages of other metals: (a) Duraloy A contains 27 to 30% chromium, 0.5% manganese and some carbon. (b) Duraloy B contains 16 to 18% chromium, less than 0.5% manganese and some carbon. (c) Duraloy 18-8 contains 18% chromium, 9% nickel, 0.5% manganese and some carbon. They offer good resistance to all concentrations of hot and cold nitric acid and sodium and ammonium hydroxides. They are all resistant to all concentrations of acetic acid in the cold, but Duraloy A and B are not resistant to hot concentrated acetic acid. They are all resistant to sea water and moist sulfurous acids and Duraloy A is resistant to mine waters.

Durene (Durol; Symmetrical tetramethylbenzene) $C_6H_2(CH_3)_4$.
Color and properties: Colorless crystals; camphor-like odor.
Constants: M.p. 79° to 81°C.; b.p. 189° to 191°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: By heating ortho-xylene and methyl chloride in presence of aluminum chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Durimet. Ferrous alloys containing in addition to iron the following percentages of other metals: (a) Durimet A contains 25% nickel, 5% silicon and 0.25% carbon. It is resistant to hot and cold sulfuric acid in dilutions up to 25%, cold very dilute hydrochloric acid, dilute acetic acid in hot and cold, hot and cold sodium and ammonium hydroxides in all concentrations and moist sulfurous atmospheres and mine waters. (b) Durimet B contains 35% nickel, 12% chromium, 5% silicon and 0.25% carbon. It is resistant to hot and cold sulfuric acid in dilutions up to 25%, all concentrations of hot and cold nitric and acetic acids and sodium and ammonium hydroxides, and mine and sea waters and moist sulfurous atmospheres. (c) Durimet D contains 15% nickel, 2.5% chromium, 3% silicon and 0.6% carbon. Its resistance to corrosion is practically the same as Durimet A.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Duriron. A ferrous alloy containing in addition to iron 14.5% silicon, 0.85% carbon and 0.35% manganese. It offers good resistance to all concentrations of hot and cold sulfuric, nitric and acetic acids, ammonium and sodium hydroxides. It is also resistant to all concentrations of cold hydrochloric acid and to hot hydrochloric acid in concentrations up to 10%. It resists the action of mine and sea waters, moist sulfurous atmospheres and aqueous solutions of chlorine.

Durol. See Durene.

Dust-laying Media. Calcium chloride, tars, liquid asphalt-heavy asphalt oils, solutions of petroleum asphalt in gas oils, crude oils, and emulsions of oils and water have all been used for road-dust laying. See also Floor oils.

Dutch Cheese. See Mallow leaves.

Dutch Drops. See Haarlem oil.

Dutch Liquid. See Ethylene chloride.

Dutch Metal. A cheap imitation of goldleaf made of an alloy of copper and zinc.

Dutch Oil. See Haarlem oil.

Dutchman's Breeches. See Corydalis.

Dwarf Bay. See Mezereum.

Dwarf Elder. See Ebulus.

Dyer's Saffron. See Carthamus.

Dyeing Assistants. Compounds added to the dyebath to facilitate the dyeing process.

Dyes. From a practical standpoint dyes may best be classified from the point of view of their behavior toward the various fibers.

Varieties:

Acid. A class of dyes mostly derived from azo compounds of benzene and toluene. They are acid in character, hence the name. They dye animal fibers (wool, silk) directly, being extensively used in silk dyeing while about 75% of all wool dyeing is accomplished by their use. They are hardly ever used for dyeing vegetable fibers.

Adjective. Mordant dyes (q.v.).

After chromed. Some of the acid dyes, which may be after-treated with solutions of metallic salts, either for the purpose of developing them or of making the dyed color faster to light and washing. Chrome is the chief salt used for this purpose although bluestone (copper sulfate) is also used sometimes.

Basic. A class of dyes mostly derived from aniline and its homologs. They are basic in character, hence the name. They dye animal fibers (wool, silk) directly but can only dye a vegetable fiber (cotton) in conjunction with some acid mordant, usually tannic acid.

Developed. See Developing agents.

Fat. Oil-soluble dyes used for dyeing candles, waxes, etc.

Ice. A term applied to those colors produced by impregnating cotton fiber with a phenol and then subjecting it to the action of a solution of a diazo-salt cooled with ice. These colors are also known as ingrain colors. See also Developing agents.

Ingrain. See Dyes, ice.

Mineral. Metallic salts which deposit a colored precipitate when applied to a mordanted textile fiber. They are exceedingly fast to light and washing. Though formerly of considerable importance, this class of colors is now only of minor importance. Cotton is the fiber mostly used for the application of these colors, Prussian blue being the only one applied to wool. The only ones of importance are Prussian blue, chrome yellow, chrome green, iron buff and khaki.

Monogenetic. Dyes from which only one color can be obtained. See also Dyes, polygenetic.

Mordant. A class of dyes mostly derived from anthracene. They are neutral in character. They dye neither animal nor vegetable fibers directly but require a metallic mordant to permanently fix them upon the fibers. They are mostly applied to wool.

Polygenetic. Dyes from which different colors can be obtained according to the mordant employed. See also Dyes, monogenetic.

Substantive. A class of dyes mostly derived from benzidine and tolidine. They are neutral in character. They dye both animal and vegetable fibers directly but are mostly used with cotton, although they find some use with both wool and silk.

Sulfur. Dyes derived from organic products by fusion with sulfur and sodium sulfide. They are used exclusively for vegetable fibers which they dye directly from solutions of sodium sulfide.

Vat. A class of dyes derived principally from anthracene, anthraquinone, carbazol, indigo and indophenol, and to a certain extent includes the sulfur colors. They are insoluble in water and therefore cannot be used directly for dyeing. On reduction in a dilute alkaline bath they are converted into leuco-compounds which have a marked affinity for the fiber and are readily converted into the dye again by the action of weak oxidizing agents such as air. They are widely used for cotton but find only limited application on silk and wool because of the necessity for using an alkaline bath. The colors produced in this manner are the fastest known.

Vat Sulfurized. A class of dyes intermediate between vat dyes and sulfur dyes in their properties.

Vegetable. Vegetable substances which yield coloring matter. Previous to the discovery of the coal-tar dyes the textile colorist had to rely upon either the mineral or the vegetable dyes. In general, the majority of the natural dyes belong to the mordant class, though a few will combine with wool directly after the manner of the acid dyes, and a limited number act in the same manner as substantive dyes. Typical dyes of this class are logwood, natural indigo, fustic, hypernic, cochineal, madder, cutch, camwood, brazil-wood, archil, quercitron, safflower, Persian berries, turmeric, etc.

Dynamagnite. A dynamite using magnesia alba as the absorbent.

Dynamite.

An explosive composed of nitroglycerin held in an absorbent commonly called the dope. Diatomaceous earth was formerly used exclusively as the dope but its use has been largely replaced by wood pulp or flour and either sodium, potassium, or ammonium nitrates, the latter also increasing the explosive force. The quantity of nitroglycerin in dynamite varies from 25 to 75% and dynamites are generally classified according to their nitroglycerin content. Thus a 50% dynamite is one containing 50% nitroglycerin.

Dynamite, Gelatin.

Dynamites made by gelatinizing the nitroglycerin with collodion cotton before adding the dope. The final product is dense, plastic, more water-resisting and less bulky than other high explosives of corresponding grades and produces a relatively small amount of noxious fumes. The composition of gelatin dynamite varies within wide limits so that in consistency and plasticity it may be made to suit all purposes. The following formula is typical: 62.5% nitroglycerin gelatinized with 2.5% collodion cotton; 25.5% sodium nitrate; 8.7% meal; 0.8% soda ash.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Shaft sinking, tunnel driving, underground work where ventilation is poor; wet and underwater work; quarrying in tight rock; ore mining; blasting ice.

Dynamite, Guhr. See Dynamite.

Dynamites, Safety. See Explosives, safety.

Dynamo Oils (Dynamo engine oils).
Viscous neutral oils used for the lubrication of dynamos.
Constants, cited by one textbook of some typical grades:

Gravity °Bé	Flash point °F.	Fire test °F.	Cold test °F.	Saybolt viscosity at 212°F.
30.5	415	480	20	215
30.5	410	465	25	190
31.0	415	480	20	210
31.5	400	450	25	161
32.0	400	460	20	145

Railroad shipping regulations: None.*
See also Lubricants, United States Government Master Specifications.

Dyscrasite.
A natural silver antimonide of very variable composition ranging from Ag_6Sb to Ag_3Sb. Has also been recognized as a mixture of the two with sp.gr. 10.05 and 9.63 to 9.82, respectively.
Color, silver-white to tin-white, sometimes tarnished, yellowish or blackish. Streak, same color. Metallic luster.
Occurrence: Germany, France, Canada.
Uses: Important ore of silver and antimony.

Dysodil (Paper coal). A carbonaceous material which burns with an odor resembling that of burning rubber. It is found in Sicily.

Dysprosia. See Dysprosium oxide.

Dysprosium Dy. One of the rare earth (q.v.) metals.

Dysprosium Nitrate $Dy(NO_3)_3.5H_2O$.
Color and properties: Yellow crystals.
Constants: M.p. 88.6°C. (in its water of crystallization).
Soluble in water.

Dysprosium Oxide (Dysprosia) Dy_2O_3.
Color and properties: White substance; 12.8 times more magnetic than ferric oxide.
Constants: Sp.gr. 7.81 (27°/4°).
Soluble in acids.
See also Rare earths.

Dysprosium Sulfate $Dy_2(SO_4)_3.8H_2O$.
Color and properties: Brilliant yellow crystals, stable at 110°C. and completely dehydrated at 360°C.
Soluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

E

Eagle Vine. See Condurango.

Earth, Diatomaceous. See Diatomaceous earth.

Earth, Infusorial. See Diatomaceous earth.

Earth Metals, Rare. See Rare earths.

Earth-nut Oil. See Peanut.

Earth Oil. See Petroleum.

Earth, Red. A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Earth, Siliceous. See Diatomaceous earth.

Earth Wax. See Ceresin.

Earths, Green (Terre verte; Terra verde; Bohemian earth; Veronese earth; Verona green; Tyrolean earth; Seladon green; Cyprian earth). Collective name for various pale bluish-green earths formed by disintegration of minerals, principally those of the hornblend (q.v.) type. These earths are used as pigments. They are somewhat deficient in body and intensity of hue but are of some importance for use in lime colors due to their property of fixing basic coal-tar dyes to some extent without the aid of precipitants. This property renders the resulting colors proof against the alkaline action of quicklime.

Earths, Rare. See Rare earths.

East India Kino. See Kino.

East India Root. See Galanga.

East Indian Balmony. See Chirata.

East Indian Copaiba Balsam Oil. See Gurjun balsam oil.

East Indian Geranium Oil. See Palmarosa oil.

East Indian Gum. See Arabic gum.

Easter Flower. See Pulsatilla.

Eau de Javelle. See Javelle water.

Eau de Labarraque. See Sodium hypochlorite.

Ebonite. Black, hard, vulcanized rubber used for valves, faucets, pipes, electrical equipment, fountain-pens, toilet articles, handles, etc., made from the cheaper grades of rubber.

Ebulus (Blood elder; Bloodwort; Dwarf elder).

Derivation: Fruit, herb and root of Sambucus ebulus.

Habitat: Europe.

Grades: Technical.

Containers: Bags; boxes.

Uses: Medicine.

Railroad shipping regulations: None.*

Ecgonine $C_9H_{15}NO_3.H_2O$.

Color and properties: White, crystalline alkaloid; levo-rotatory; poisonous!

Constants: M.p. 198°C.

Soluble in water; slightly soluble in alcohol; very slightly soluble in ether.

Derivation: By decomposition of cocaine with hydrochloric acid.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Ecgonine Hydrochloride $C_9H_{15}NO_3.HCl$.

Color and properties: White, crystalline tablets; poisonous!

Constants: M.p. 246°C.; optical rotation —57°.

Soluble in water; slightly soluble in alcohol.

Derivation: By the action of hydrochloric acid on ecgonine.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Echinacea (Cone flower; Black sampson; Purple cone flower).

Root of Brauneria pallida and B. augustifolia.

Habitat: North America.

Grades: Technical; N.F.

Containers: Bags; boxes.

Uses: Medicine (infectious conditions).

Railroad shipping regulations: None.*

Echitamine. See Ditaine.

Eclipse. See Benzopurpurin.

Edenite. See Hornblend.

Edible Gelatin. See Glue and gelatin.

Edible Oils. Vegetable or animal oils, containing not over 0.1% of free fatty acid, used for food purposes (cooking, salad-dressing and manufacture of oleomargarine or other butter substitutes, such as butter oils, deodorized oils, margarine oils, salad oils).

Edinol. A photographic developer composed of aminosaligenineacetone sulfite, potassium hydroxide and potassium bromide.

Edwarsite. See Monazite.

Egg Oil. See Egg yolk.

Egg Yolk (Egg oil).

Derivation: From the eggs of hens, ducks and geese. The yolks are separated from the whites and the yolks are then mixed with common salt; sometimes a small amount of borax is added as a preservative.

Grades: Technical.

Containers: Wooden barrels.

Uses: Leather dressing; tanning; baking; dairy products; pharmaceuticals (ointments, emulsions, drug preparations); soap; perfumery.

Railroad shipping regulations: None.*

Egirite. See Acmite.

Eglantine. Name applied to both isobutyl benzoate and isobutyl phenylacetate.

Eglestonite. A natural mercury oxychloride, Hg_4Cl_2O. Found in Texas.

Egyptian Asphalt. A glance pitch (q.v.) found in the Arabian desert between the Nile and the Red Sea. It has a sp.gr. at 77°F. of 1.10, contains over 99% non-mineral content, is soluble in carbon bisulfide and has a fusing point of 285°F. (B & R).

Railroad shipping regulations: None.*

Egyptian Privet. See Henna.

Egyptianized Clay. See under Clays.

Ehrlich 606. See Arsphenamine.

Eikonogen (Amino-2-naphthol-2-sulfonic acid, sodium salt)

$NH_2C_{10}H_5(OH)SO_3Na.2\frac{1}{2}H_2O$.

Color and properties: White powder.

Soluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the interaction of sodium carbonate and amino-2-naphthol-2-sulfonic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Photographic developer.
Railroad shipping regulations: None.*

Eisen-Portland Cement. See under Cements, structural.

Elastic Glue. See Glue and gelatin.

Elastica. See Caoutchouc.

Elaterin $C_{20}H_{28}O_5$.
Color and properties: White, crystalline powder.
Constants: M.p. 216°C.
Soluble in chloroform; slightly soluble in alcohol, benzene and ether.
Derivation: From the juice of Echallium elaterium.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine (powerful cathartic).
Railroad shipping regulations: None.*

Elaterite (Elastic bitumen; Mineral caoutchouc). A dark brown fossil resin found in lead mines in England and elsewhere. Though occasionally hard and brittle, it is usually soft and elastic and is sometimes much like India rubber.

Elaterium (White, English or Clutterbuck's elaterium).
Color and properties: Grayish-green, flat or slightly curled small pieces or powder.
Derivation: Sediment from the juice of fruit of the wild cucumber (Ecballium elaterium).
Habitat: Mediterranean regions.
Partially soluble in hot alcohol.
Grades: Technical; U.S.P.
Containers: Tins.
Uses: Medicine (powerful cathartic).
Railroad shipping regulations: None.*

Elayl. See Ethylene.

Elayl Chloride. See Ethylene chloride.

Elcomet. A nickel-chromium steel of high silicon content which offers good resistance to the corrosion of all concentrations of hot and cold sulfuric, nitric and acetic acids, ammonium and sodium hydroxides and mine and sea waters and moist sulfurous atmospheres.

Elder. See Sambucus.

Elder, Blood. See Ebulus.

Elder, Dwarf. See Ebulus.

Elder Oil (Cabbage oil). Olive oil in which elder leaves have been boiled.

Elecampane. See Inula.

Elecampane Camphor. See Helenin.

Electrargol. A colloidal silver suspension containing 0.04% silver, used in medicine as an antibacterial. Unofficial.
Railroad shipping regulations: None.*
See also Silver, colloidal.

Electraurol. A form of colloidal gold.

Electric Calamine. See Calamine.

Electric Cements. See Cements, electric.

Electric Steel-furnace Slag. See Slag.

Electricidal. A colloidal suspension of iridium used hypodermically in medicine. Unofficial.

Electriridol. A form of colloidal iridium.

Electrocollargol. A colloidal silver suspension used in medicine, as an antibacterial. Unofficial. See also Silver, colloidal.

Electrocuprol. A form of colloidal copper.

Electrokali. A Swedish fertilizer. It is a potassium silicate slag obtained in the manufacture of ferrosilicon.

Electrolon.
Trade name for silicon carbide products.
Color and properties: Green to bluish-black, iridescent, porous, crystalline, sharp-grained platelets or mass.
Constants: Sp.gr. 3.12 to 3.20.
Derivation: By heating a mixture of coke, sand, shale and sawdust in the electric furnace.
Grades: Grains, from 10 mesh to finest powders.
Containers: Kegs.
Uses: Abrasives; grindstones; hones; sharpening-stones; anti-slip pavements; grinding wheels; refractories.
Railroad shipping regulations: None.*

Electrolyte Acid. See Battery acid.

Electromartiol. A colloidal suspension of iron developed for experimental treatment of cancer. Unofficial.

Electromercurol. A colloidal suspension of mercury containing 0.1% of mercury developed for experimental treatment of cancer. Unofficial.

Electropalladiol. A form of colloidal palladium.

Electroplatinol. A form of colloidal platinum.

Electrorhodiol. A form of colloidal rhodium.

Electroselenium. A colloidal suspension of selenium developed for experimental treatment of cancer. Unofficial.

Electrum.
A natural alloy of gold and silver, pale yellow to yellowish-white in color. The gold-silver ratio is variable (1:1)=36.0% Ag, 2.5:1=18.0% Ag). Sp.gr. 15.5 to 12.5. A variety containing up to 20% copper is found in the Urals. Porpezite contains 10% palladium. Maldonite (Australian black gold) contains some bismuth.

Elemi Gum (Canarium).
Derivation: A resin from certain trees, Canarium commune, in the Philippine Islands, Canarium maritanum in Mauritius and Amyris elemifera in Mexico and Brazil.
Soluble in alcohol, benzene and turpentine.
Grades: Technical.
Containers: Bags.
Uses: Varnishes; lacquers; perfume fixative.
Railroad shipping regulations: None.*

Elemi Oil.
Color and properties: An almost colorless, liquid oil; agreeable aromatic odor and taste.
Chief known constituents: Limonene and phellandrene.
Constants: Sp.gr. 0.870 to 0.910.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: Distilled from Manila elemi, an oleoresin of uncertain botanical origin.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine; perfumes.
Railroad shipping regulations: None.*

Eleolite. See Nephilite.

Eleuthera Bark. See Cascarilla.

Elinvar. See Ferronickel alloys.

Elixir of Vitriol. See Acid sulfuric, aromatic.

Elixirs. Aromatic, sweetened, spirituous preparations containing small quantities of active medicinal substances.

Ellagic Acid. See Gallogen.

Elm. See Ulmus.

Elon. See Methyl-para-aminophenol sulfate.

Eluteria Bark. See Cascarilla.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Embelia.
Color and properties: Dark red to nearly black, warty or striated pieces.
Derivation: Dried fruit of Embelia ribes or Embelia robusta.
Grades: Technical.
Containers: Bags.
Uses: Medicine (intestinal vermicide).
Railroad shipping regulations: None.*

Embolite Ag(ClBr).
One of the ceragyrite or natural silver haloid (q.v.) group. Grayish-green to yellowish-green in color, darkening on exposure. The ratio of chlorine to bromine varies widely.
Constants: Sp.gr. 5.31 to 5.81; hardness 1 to 1.5.
Occurrence: United States (Nevada, Colorado, Arizona, New Mexico), Chile, Australia.

Emerald. See Beryl.

Emerald Green. Two pigments. The most important is copper acetoarsenite (q.v.) and the other a very durable pigment of dull green shade consisting of chromium hydroxide obtained by precipitation from a solution of a chromium salt by zinc hydroxide.

Emerald, Oriental. See Corundum.

Emery. See Corundum.

Emetic Herb. See Lobelia.

Emetin. See Emetine.

Emetine (Emetin) $C_{30}H_{40}N_2O_5$.
Color and properties: Whitish, pulverulent mixture of alkaloids; very bitter taste; darkens on exposure to light; poisonous!
Constants: M.p. 62° to 65°C.
The hydrochloride is soluble in water and alcohol.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By extraction and crystallization from root of Cephalis ipecacuanha, or synthetically.
Grades: U.S.P. (hydrochloride).
Containers: ⅛, ¼, ½, 1 oz. vials; 5, 10, 15 grain vials.
Uses: Medicine (usually in the form of the hydrochloride, for dysentery).
Railroad shipping regulations: None.*

Emodin $C_{14}H_4O_2(OH)_3CH_3$.
Trihydroxymethylanthraquinone found, either free or combined with a sugar as in glucoside, in aloes, Rhamus species, rhubarb, Rumex. A synthetic product is used in medicine as a cathartic.

Emperor Green. See Copper acetoarsenite.

Emplastrum. Medicinal plaster.

Empyroform.
Color and properties: Brown powder; peculiar odor dissimilar to that of tar; decomposes with liberation of formaldehyde on heating.
Soluble in acetone, chloroform and caustic alkalis; insoluble in water and alcohol.
Derivation: Condensation product of tar and formaldehyde.
Uses: Medicine (inflammatory skin diseases, unofficial).
Railroad shipping regulations: None.*

Emulsin (Synaptase). An enzyme from sweet almonds.
Color and properties: White powder; odorless and tasteless; capable of hydrolyzing glucosides such as amygdalin.
Soluble in water; insoluble in ether and alcohol.
Derivation: By extracting an emulsion of almonds with ether, filtering the clear solution and precipitating the emulsion with alcohol.
Railroad shipping regulations: None.*

Emulsions.
An emulsion consists of drops of one liquid suspended in another liquid. When these drops are stabilized by an electrical charge, they behave like any other colloidal solution of the same type; but only very dilute emulsions are made in this way.

According to Bancroft ("Applied Colloid Chemistry," New York, McGraw-Hill Book Co., Inc., 1926) "in most cases there is an actual film around the globules which keeps them from coalescing. It is evident that with any pair of non-miscible liquids there may be two sets of emulsions, one with drops of oil suspended in water and one with drops of water suspended in oil, the word 'oil' being used to designate the other liquid. The necessary conditions for forming a stable emulsion are that the drops shall be so small that they will stay suspended and that there shall be a sufficiently viscous or plastic film around each drop to keep the drops from coalescing. An emulsifying agent is therefore a substance which goes into the interface and produces a film having satisfactory physical properties.

"Gibbs points out that if we call the two liquids A and B and the film C we have to consider two surface tensions, the one at the contact between A and C, and the one at the contact between B and C. If the surface tension at the water-emulsifying agent is less than at the oil-emulsifying agent interface, the film will tend to curve so as to be convex on the water side and we shall have a tendency to emulsify in water. If the surface tension at the oil-emulsifying interface is lower than the surface tension at the water-emulsifying interface, the film will tend to curve so as to be convex on the oil side and we shall have a tendency to emulsify water in oil.

"The simplest general formulation is by Briggs. We get oil-in-water if the emulsifying agent at the interface is chiefly in the water phase and water-in-oil if the emulsifying agent at the interface is chiefly in the oil phase. For example if we start with a water-soluble colloid which is adsorbed strongly at the interface, but is not peptized markedly by oil, we should expect to emulsify oil in water. By peptization is meant the disintegration of larger masses, especially if it is brought about by chemical as opposed to mechanical or electrical disintegration. If we start with an oil-soluble colloid, which is adsorbed strongly at the interface but is not peptized markedly by water, we should expect to emulsify water in oil. An overwhelming majority of emulsions come in the latter class.

"Sodium and potassium oleates are water-soluble colloids and are excellent for emulsifying oils in water. The gums are also water-soluble colloids much used in pharmaceutical work. Calcium and magnesium oleates form colloidal solutions in oil and can therefore be used to emulsify water in oil. Rosin and resinates act in the same way and the water in ready-mixed paints is an emulsion of water as drops in linseed oil containing mucilaginous material. Water, stirred into a heavy lubricating oil containing lime soap, will be emulsified in the oil changing it to a grease. Lanolin will emulsify water and may be made to take up 80 per cent of it. The emulsifying agent is said to be isocholesterol."

Other examples of emulsions are as follows: Degras used in dubbing leather is an emulsion of oil in water. Water glass will emulsify nitroglycerin. Milk is an emulsion with butter fat as drops in a water phase. Mayonnaise is an emulsion of oil in water with egg as the emulsifying agent. Cod-liver oil is of the oil-in-water type; carron oil of the water-in-oil type.

The pharmacists make great use of emulsions of oil in water. The Dispensatory defines emulsions as "liquid preparations in which oleaginous substances are suspended in aqueous fluids by the intervention of gum or other viscid matter." Typical pharmaceutical emulsions are emulsions of cod-liver oil, turpentine, petrolatum, asafetida.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

The proportion of gum and water necessary to make a good emulsion varies with the oil.

There are two general methods in vogue for making emulsions. In America the gum which is used as the emulsifying agent is peptized and the resulting colloidal solution is placed in a large mortar. The oil is added a little at a time or in four separate portions with constant stirring in the same direction. In the continental method, the gum is ground in a mortar with the oil in which it does not dissolve and enough water to emulsify all the gum is added at once.

Enamel Brick Clay. See under Clays.

Enamel Clay. See under Clays.

Enargite (Clarite; Luzonite)

Cu_3AsS_4 or $3Cu_2S.As_2S_5$, with some Sb.

Grayish-black to iron-black mineral with grayish-black streak and metallic luster. Contains 48.3% copper, 19.1% arsenic, 32.6% sulfur.

Soluble in aqua regia.

Constants: Sp.gr. 4.43 to 4.45; hardness 3.

Occurrence: United States (South Carolina, Colorado, Utah, Montana), Germany, Philippines.

Uses: Important ore of copper and arsenic.

Endlichite. Similar mineral to vanadinite (q.v.) excepting that the vanadium is replaced by arsenic.

Enduro. Ferrous alloys containing in addition to iron the following percentages of other metals. (a) Enduro A (1) contains 16.5 to 18.5% chromium and a maximum of 0.1% carbon. The maximum content of other metals is 0.5% manganese, 0.5 to 1.25% silicon, 0.25% nickel; (2) contains 16.5 to 18.5% chromium, 0.75% silicon and a maximum of 0.1% carbon. The former is reported as resistant to hot and cold concentrated sulfuric acid, all concentrations of hot and cold nitric and acetic acids except the concentrated boiling acids, all concentrations of hot and cold ammonium and sodium hydroxides, and mine and sea waters, moist sulfurous atmospheres and aqueous solutions of chlorine. The latter is reported as resistant to all concentrations of hot and cold nitric acid, cold, very dilute acetic acid, mine and sea waters and moist sulfurous atmospheres. (b) Enduro KA2 contains 16.5 to 19.5% chromium, 7 to 10% nickel, and the following maximum percentages: 0.75% silicon, 0.5% manganese, 0.15% carbon. It is resistant to cold dilute nitric acid and hot nitric acid in all concentrations, all concentrations hot and cold acetic acid except boiling concentrated acid, all concentrations of sodium hydroxide, and mine and sea waters and moist sulfurous atmospheres. (c) Enduro KM1 contains 13 to 14% chromium and the following maximum percentages: 2% nickel, 0.3 to 0.6% manganese, 0.12% carbon. It is resistant to sea and mine waters. (d) Enduro S contains 12.5 to 14.5% chromium, 0.5% (maximum) manganese, 0.5% (maximum) silicon, 0.25% nickel and 0.05 to 0.12% carbon. (e) Enduro S 15 has the same composition as Enduro S except that the nickel content is 0.5% (minimum) and the carbon content is 0.12 to 0.18%. They are both resistant to all concentrations of hot and cold nitric and acetic acids except the boiling concentrated acid, all concentrations of hot and cold sodium and ammonium hydroxides, mine and sea waters, moist sulfurous atmospheres and aqueous solutions of chlorine.

Enesol (Mercuric salicylarsenate; Hydrargyri salicylas).

Color and properties: White amorphous powder.

Contains 38.46% mercury, 14.4% arsenic. Commercial product is a 3% solution.

Difficultly soluble in water.

Derivation: Reaction between basic mercuric salicylate and methyl arsenous acid.

Uses: Medicine (antisyphilitic, unofficial).

Railroad shipping regulations: Class B poison(?)*

Engine Grease. A hot, neutral, soluble soda or potash soap incorporated with cold mineral oil is stated to be satisfactory for this purpose.

Engine Oils.

There is considerable variation in the characteristics of the oils used for the lubrication of engines, the range cited by one text book being about as follows:

Gravity 23° to 32°Bé.; flash point 300° to 400°F.; viscosity 50 to 400 at 70°F.

One viscous neutral oil used for this purpose has the following characteristics:

Gravity 29° to 30°Bé.; flash point 400° to 415°F.; fire test 450° to 480°F.; cold test 20° to 30°F.; Saybolt viscosity 180 to 300.

The oil described under air compressor oils (q.v.) has been used as a high speed oil and for splash lubrication.

Engine oils sometimes are mixed with animal oils.

Railroad shipping regulations: None.*

See also Automobile cylinder oils; Gas engine oils; Lubricants, United States Government Master Specifications; Spindle oils.

English Bean. See Tonka.

English Elaterium. See Elaterium.

English Laurel. See Laurocerasi folia.

English Red. A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Enstatite $(MgFe)SiO_3$.

A natural silicate of iron and magnesium. Found in schists, peridotites, serpentines and meteorites.

Color, brown, green, or white (grayish, yellowish, greenish). Pearly to vitreous luster; colorless to grayish streak.

Constants: Sp.gr. 3.1 to 3.3; hardness 5.5.

Occurrence: United States (New York, Pennsylvania, North Carolina, Maryland), Moravia, Bavaria, Germany, Norway, South Africa.

Uses: The best varieties of the green colors found in South Africa are used as gem stones.

Enzymes. A class of albumin-like substances, chemically exceedingly complex, only two of which (urease, pepsin) have been isolated in a pure state. Their exact composition is still unknown, but many of them have certain properties common to the proteins. They are soluble in water, and are precipitated by alcohol (some are coagulated). Some of them are precipitable by "salting out" and they are diffusible only to a slight extent. The most important characteristic of enzymes is the property of changing chemically certain other substances, without being themselves changed at all. Their activity depends on the hydrogen-ion concentration (or pH), on the temperature and concentration of the solution of the substance on which they are acting. Heating in water solution destroys their activity. Enzymes are of enormous importance as nearly all biological processes are due to enzyme action.

Enzymes produce hydrolysis (decompose fats and the like, convert aldehydes into a mixture of acid and alcohol, invert sugars, digest proteins and the like), coagulate (clot the blood, curdle milk), oxidize (convert alcohol into acetic acid), reduce or decompose (lactic acid and alcohol fermentations). The number of enzymes is exceedingly great, the best known are: Diastase, emulsin, lipase, maltase, pancreatin, pepsin, ptyalin, rennet, trypsin, invertase, and urease. (For data on these see specific enzyme.)

Also see Convertit, Degomma, Diamalt, special Dias tafor, Diax, Polyzime, Rapidase, Taka-diastase.

Eosin (Eosine; Bromeosin; Tetrabromofluorescein) $C_{20}H_8Br_4O_5$.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Red, crystalline powder. Soluble in alcohol and acetic acid; insoluble in water. The potassium salt is soluble in water.
Derivation: By the bromination of fluorescein.
Grades: Technical; pure.
Containers: Barrels; boxes.
Uses: Dyeing silk, cotton and wool; making red writing ink.
Railroad shipping regulations: None.*

Eosine. See Eosin.

Ephedrine $C_{10}H_{15}NO$.
Color and properties: Colorless crystals.
Constants: B.p. 225°C.
Soluble in water, alcohol and ether.
Derivation: By extraction from the leaves of Ephedra helvetica and crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Epicarin (Oxynaphthyl-ortho-oxymetatoluylic acid, beta-)
$C_6H_3(OH)(COOH)(CH_2C_{10}H_6OH)$.
Color and properties: Slightly yellowish crystals, less toxic than naphthol.
Constants: M.p. 190° to 195°C.
Soluble in alcohol, ether, soaps; difficultly soluble in water.
Uses: Medicine (mange, scabies, ringworm, prurigo, other skin diseases, unofficial).
Railroad shipping regulations: None.*

Epidosite. A rock consisting of epidosite and quartz (q.v.) and sometimes containing gold. Banded epidosites are sometimes used for ornamental stones.

Epidote $HCa_2(AlFe)_3Si_3O_{13}$.
The principal member of a group of basic orthosilicate minerals for which the general formulas have been written: $HR''_2R'''_3Si_3O_{13}$ or $R''_2(R'''OH)R'''_2(SiO_4)_3$ where $R''=Ca,Fe''$ and $R'''=Al,Fe''',Mn''',Ce$.
Color and properties: Color, various shades of green, including pistachio-green, greenish-black, black, red, yellow, gray, grayish-white. The aluminum-iron ratio varies usually from 3:2 to 6:1.
Constants: Sp.gr. 3.25 to 3.5; hardness 6 to 7.
Occurrence: United States (New Hampshire, Massachusetts, Connecticut, New York, North Carolina, Michigan, Idaho, California, Alaska), Canada, France, Italy, Switzerland, Austria, Germany, Norway, Russia.
Uses: Sometimes as a gem stone.
See also Epidosite, Piedmontite, Loisite, Allanite.

Epigaea (Trailing arbutus; Gravel plant, Ground laurel).
Derivation: Leaves of Epigaea repens.
Habitat: United States (Florida to Michigan and northwards).
Grades: Technical.
Containers: Bags; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Epinephrin. See Adrenalin.

"Eponit." Trade name for a decolorizing carbon.

Epsom Salts. See Magnesium sulfate.

Epsomite (Hair salt) $MgSO_4.7H_2O$.
A natural hydrated magnesium sulfate or Epsom salts. Found in United States (Wyoming, Washington), Canada, England, Germany. See also Kieserite and Magnesium sulfate.

Equisetum (Horsetail; Field horsetail; Bottle-rush).
Derivation: Whole plant of Equisetum arvense and of Equisetum hyemale.
Habitat: Northern Europe, Asia and North America (south to Virginia and California).
Grades: Technical.
Containers: Boxes.
Uses: Medicine; polishing agent for tinware.
Railroad shipping regulations: None.*

Erbia. See Erbium oxide.

Erbium (Neo-erbium) Er.
Color and properties: Dark gray powder.
Constants: Sp.gr. 4.77 (15°C.).

Erbium Nitrate $Er(NO_3)_3.5H_2O$.
Color and properties: Large reddish crystals.

Erbium Oxalate $Er_2(C_2O_4)_3.10H_2O$.
Color and properties: Reddish microcrystalline powder.
Constants: Sp.gr. 8.64; specific heat 0.065 (0° to 100°C.); b.p. 3,000°C.

Erbium Oxide (Erbia) Er_2O_3.
Color and properties: Pink powder sometimes containing some carbon dioxide.
Constants: Sp.gr. 8.64; specific heat 0.065.
Derivation: By heating the oxalate.
See also Rare earths.

Erbium Sulfate $Er_2(SO_4)_3.8H_2O$.
Color and properties: Pink monoclinic crystals.
Constants: Sp.gr. given variously as 2.731, 3.18 and 3.217.

Erdmann's Reagent. A reagent used in testing for alkaloids. Made by the addition of 40 cc. of concentrated sulfuric acid to 20 drops of a solution containing 10 drops of nitric acid (sp.gr. 1.153) and 20 cc. of water.

Eremite. See Monazite.

Ergot (Secale cornutum; Spurred rye).
A fungus growth on rye.
Habitat: Europe; cultivated in Spain and Russia.
Grades: Spanish; Russian; U.S.P.
Containers: 140, 200 lb. bags; bags of variable size.
Uses: Medicine (obstetrics); ergot oil.
Railroad shipping regulations: None.*

Ergot Oil.
Color and properties: Brown, liquid, fixed oil.
Chief constituents: Cholesterin, triglycerides of olein and palmitin.
Constants: Sp.gr. 0.924.
Soluble in alcohol and alkaline solutions; insoluble in water.
Derivation: From the ergot of rye, Claviceps purpurea, by extraction with alcohol, and evaporation of the latter.
Method of purification: Distillation.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ergotinine $C_{55}H_{40}N_4O_6$.
Color and properties: Yellowish, crystalline alkaloid; poisonous!
Constants: M.p. 205°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By extraction of sclerotium of ergot, Claviceps purpurea and crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ericin. See Salicylic acid methoxymethyl ester.

Erigeron (Fleabane; Horseweed; Scabious).
Derivation: Leaves and tops of Erigeron canadensis.
Habitat: Northern and central United States.
Grades: Technical.
Containers: Boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Erigeron Oil (Fleabane oil; Horseweed oil; Butterweed oil).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Pale, yellow, limpid liquid; darkening and thickening with age and exposure; peculiar aromatic, persistent odor; aromatic, slightly pungent taste.
Chief known constituent: Dextrolimonene; terpineol; esters.
Constants: Sp.gr. 0.8565 to 0.868 (15°C.); b.p. 175° to 180°C.; optical rotation +52° to +83°; acid value 0; ester value 39 to 108, after acetylation 67 to 108.
Soluble in an equal vol. of 90% alcohol, but sometimes remains turbid after additions of several volumes of the solvent; also soluble in ether, chloroform and carbon bisulfide.
Derivation: Distilled from the fresh, flowering herb of Erigeron canadense.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; copper flasks.
Railroad shipping regulations: None.*

Erinoid. See Galalith.

Eriodictyon (Yerba santa; Consumptives' weed; Bear's weed; Mountain balm).
Color and properties: Brownish fragments of leaves; slight, aromatic odor.
Derivation: Dried leaves of Eriodictyon californicum.
Habitat: California.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine (bitter tonic and expectorant).
Railroad shipping regulations: None.*

Erlanger Blue. See Iron blues.

Erubescite. See Bornite.

Erythrea (European centaury; Bitter herb; Bloodwort).
Derivation: Leaves and tops of Erythraea centaurium.
Habitat: Europe and United States.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (stomachic).
Railroad shipping regulations: None.*

Erythrite (Cobalt bloom) $Co_3(AsO_4)_2 \cdot 8H_2O$.
A natural hydrous cobalt arsenate found in the oxidized parts of cobalt and arsenic-bearing veins. Crimson, peach red, pink or pearl gray in color, with adamantine or pearly luster. Contains 37.5% cobalt oxide. Soluble in hydrochloric acid.
Constants: Sp.gr. 2.91 to 2.95; hardness 1.5 to 2.5.
Occurrence: United States (California, Colorado, Idaho, Nevada), Ontario.

Erythroxylon. See Coca.

Eschenite (Eschynite).
A complex mineral containing about 21% titanium oxide, 32% columbium oxide, 17% thoria, 9% ceria and related oxides (see Rare earths) and small amounts of calcium and iron oxides. Color, nearly black, inclining to brownish-yellow when translucent.
Constants: Sp.gr. 4.93 to 5.168; hardness 5 to 6.
Occurrence: Russia, Norway.

Eschynite. See Eschenite.

Eserine. Physostigmine (q.v.).

Esparto (Spanish grass). A grass with a tough fiber, cultivated in Spain, and used chiefly for cordage and especially in England for papermaking.

Essence of Mirbane. See Nitrobenzene.

Essence of Myrbane. See Nitrobenzene.

Essence of Pineapple Oil. See Ananas oil.

Essential Oils.
Color and properties: Volatile oils, of pungent taste, usually nearly colorless when fresh, but becoming darker and thick on exposure to the air. Unsaponifiable, with the exception of those containing organic ethers. Many are optically active. Some contain resins in solution and are then called oleoresins, or balsams. See Oleoresin, also Balsams.
Constants: Sp.gr.: This usually ranges from 0.850 to 1.100. Note: Since the advent of terpeneless oils and terpenes (approximate sp.gr. 0.800) removed from these have become dangerous adulterants. Their addition in appreciable quantity, which lowers the gravity, may be concealed by adding some ester of high gravity like benzyl benzoate (sp.gr. 1.12). B.p.: Since all essential oils are mixtures of many different chemical bodies which differ widely in boiling point, this is of secondary importance.
Soluble in alcohol, carbon bisulfide, carbon tetrachloride, chloroform, petroleum ether and fatty oils; insoluble in water although they impart their odor and taste to it.
Derivation: Formed and contained in flowers and plants to which they supply the characteristic odor commonly identified with the flower. Some can also be prepared synthetically.
Methods of extraction: (a) By steam distillation; (b) by pressing (fruit rinds); (c) by solvent extraction; (d) by maceration of the flowers and leaves in fat and treating the fat with a solvent; (e) by enfleurage (employed for those very delicate oils whose odors are destroyed by even moderate heat); i.e., exposing odorless fats to the exhalations of flowers until they become strongly charged with the perfume and then treating the fat with a solvent.
Uses: Perfumery; flavors.
See also: Essential oils, terpeneless and sesquiterpeneless. For additional data see under specific essential oil.

Essential Oils, Terpeneless and Sesquiterpeneless.
Essential oils concentrated by the elimination of the terpene and sesquiterpene hydrocarbons which are valueless as regards flavoring capacity. They are characterized by a high degree of solubility in diluted alcohol.
Derivation: (a) By fractional distillation of essential oils under reduced pressure; (b) by distilling a weak alcoholic solution of essential oil, the distillate separating into two layers, the top one consisting of terpenes and the bottom one of an alcoholic solution of the odorous constituents. The latter is redistilled.
Uses: The preparation of soluble essences for the mineral-water industry and wherever flavoring materials more soluble than ordinary essential oils are needed.
Note: Essential oils sold as "concentrated" may not necessarily be "terpeneless." Oils sold as such should be guaranteed "terpeneless" or "terpeneless and sesquiterpeneless." "Sesquiterpeneless oils" are usually somewhat stronger than "terpeneless oils" and are more soluble, being mostly soluble in all proportions of 60% alcohol.
For additional data see under specific terpeneless essential oil.

Esterol. See Benzyl succinate.

Esters. Organic compounds corresponding to "salts" in inorganic chemistry. They may be considered as derived from the acids by the exchange of the replaceable hydrogen of the latter for an organic alkyl radical, just as metallic salts result by exchanging the hydrogen for a metallic radical:

HNO_3	KNO_3	$(C_2H_5)NO_3$
nitric acid (acid)	potassium nitrate (salt)	ethyl nitrate (ester)

Estragon Oil (Tarragon oil).
Color and properties: Colorless to yellowish-green essential oil; peculiar anise-like odor;

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

aromatic but not sweet taste. Keep well stoppered.
Chief known constituent: Methyl chavicol (para-methoxyallylphenol).
Constants: Sp.gr. 0.900 to 0.945 at 15°C.; optical rotation +2° to +9°; refractive index 1.502 to 1.514; acid value up to 1; ester value 1 to 9, after acetylation 15.
Solubility in alcohol: In 6 to 11 vols. and more of 80% alcohol; in 1 vol. and more of 90% alcohol.
Derivation: Distilled from the flowering herb of Artemesia dracunulus, L.
Constants: Glass bottles; copper flasks.
Uses: Flavoring.
Railroad shipping regulations: None.*

Ethacaine. See Benzocaine benzoate.

Ethal. See Cetylic alcohol.

Ethanethiolic Acid. See Thioacetic acid.

Ethene. See Ethylene.

Ether (Sulfuric ether; Anesthesia ether; Ethyl ether; Ethyl oxide; Vinic ether) $(C_2H_5)_2O$.
Color and properties: Very light, transparent, colorless, volatile, exceedingly inflammable, mobile liquid; pleasant aromatic odor; burning and sweet taste. Have no flames or sparking electrical equipment anywhere that ether is being used. The vapor of ether, mixed with air, explodes when ignited.
Constants: Sp.gr. 0.71994; m.p. −116.2°C.; b.p. 34.97°C.; wt. per gal. 6 lbs.
Soluble in alcohol, chloroform, benzene, benzine and oils.
Derivation: By the action of sulfuric acid on ethyl alcohol, followed by distillation.
Method of purification: Rectification.
Grades: U.S.P. for anesthesia; anhydrous (distilled over sodium) C.P.; concentrated; U.S.P.; U.S.P. 1880; washed.
Containers: U.S.P. for anesthesia: ¼, ½, 1 5 lb. tins; 27, 55, 300, 600 lb. tin-lined drums; anhydrous (distilled over sodium) C.P.: 1, 5 lb. bottles; 27, 55, 300 lb. tin-lined drums; concentrated: ¼, ½, 1, 5 lb. tins; 27, 55, 100, 300, 600 lb. tin-lined drums; U.S.P.: same as "Concentrated"; U.S.P. 1880: ¼, 1, 5 lb. tins; 25, 55, 100 lb. tin-lined drums; washed: ¼, 1, 5 lb. tins; 27, 55, 100 lb. tin-lined drums.
Uses: Manufacture of smokeless powder; medicine; anesthetic; organic synthesis; analytical chemistry; priming gasoline engines; solvent for fats, oils, resins, waxes, gums and alkaloids; perfumery; pyroxylins; rayon.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Ether, Chlorinated Hydrochloric. See Ethylidene chloride.

Ether, Hydrochloric. See Ethyl chloride.

Ether, Hydrochloric, Chlorinated. See Ethylidene chloride.

Ethereal Oil. Volatile liquid consisting of equal volumes of ether and heavy oil of wine, which latter is prepared by distillation of alcohol with sulfuric acid. Used in the preparation of compound spirit of ether (Hoffman's anodyne).

Etherin. See Ethylene.

Ethers. Chemically, ethers are compounds of neutral character derived from alcohols by elimination of water (one molecule of water from two molecules of alcohol). Only the lowest member of the series (ethyl ether) is gaseous; most of them are liquid, and the highest are solid. The ethyl esters are often incorrectly called ethers, viz., acetic ether is the ethyl ester of acetic acid and is properly called ethyl acetate. Likewise, the word ether is erroneously used instead of ethyl in such terms as ether benzoate. Ether, as commonly known by the layman, is sulfuric ether (ethyl ether) and data on this ether will be found under "Ether". For data on the other ethers see first the specific common term, e.g., "Acetic ether."

Ethiops Mineral. See Mercuric sulfide, black.

Ethocaine. See Aminobenzoyldiethylaminoethanol hydrochloride, para-.

Ethol. See Cetylic alcohol.

Ethoxybenzidine (Di-para-aminoethoxydiphenyl) $C_6H_4NH_2C_6H_3(OC_2H_5)NH_2$.
Color and properties: Glistening, flat needles.
Constants: M.p. 135°C.
Soluble in alcohol; sparingly soluble in water.
Derivation: By heating ethoxybenzidine sulfonic acid, obtained from benzeneazophenetolsulfonic acid, with water in an autoclave.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis; dyes.
Railroad shipping regulations: None.*

Ethoxybenzoylaminoquinoline (Analgene; Benzanalgene; Quinalgene; Labordin) $C_9H_5(OC_2H_5)NH(COC_6H_5)N$.
Color and properties: Colorless crystals.
Constants: M.p. 208°C.
Soluble in hot alcohol.
Uses: Medicine (antipyretic analgesic, antirheumatic, unofficial).
Railroad shipping regulations: None.*

Ethyl Acetate (Acetic ether; Aether aceticus; Vinegar naphtha) $CH_3COOC_2H_5$.
Color and properties: Colorless, fragrant, inflammable liquid.
Constants: Sp.gr. 0.9003; m.p. −82.4°C.; b.p. 77.15°C.
Soluble in chloroform, alcohol and ether; slightly soluble in water.
Derivation: By heating acetic acid and ethyl alcohol in presence of sulfuric acid, and distilling.
Method of purification: Rectification.
Grades: Technical (85-88%); U.S.P.; N.F.
Containers: 1, 5 lb. bottles; 5, 10, 50, 100 gal. drums; 8,000 gal. tank cars.
Uses: Medicine; solvent; organic synthesis; flavoring; perfumery; smokeless powders; artificial fruit essences; bonbons and confections; artificial leather; solvent for phosgene gas; artificial bristles and horsehair; nitrocellulose varnishes, lacquers and dopes; nitrocellulose plastics; pharmaceuticals; rayon.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Ethyl Acetate, Anhydrous.
A specially purified grade (99-100%). Sp.gr. 0.901 at 20°C.; wt. per gal. 7.50 lbs.; boiling range 75° to 80°C.

Ethylacetic Acid. See Butyric acid.

Ethyl Acetoacetate (Diacetic ether) $CH_3COCH_2COOC_2H_5$.
Color and properties: Colorless liquid; fruity odor.
Constants: Sp.gr. 1.0212; m.p. −80°C.; b.p. 180° to 181°C.; wt. per gal. 8.55 lbs.
Soluble in alcohol; slightly soluble in water.
Derivation: By the action of metallic sodium on ethyl acetate, with subsequent distillation.
Method of purification: Redistillation.
Grades: Technical.
Containers: Glass bottles; 10, 50 gal. drums.
Uses: Organic synthesis; antipyrine.
Railroad shipping regulations: None.*

Ethylalbenzene. See Phenylacetaldehyde.

Ethyl Alcohol (Grain alcohol; Ethylic alcohol; Fermentation alcohol; Cologne spirit; Spirits of wine; Ethyl hydroxide) C_2H_5OH.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Colorless, limpid, volatile liquid; ethereal, vinous odor; pungent taste.
Constants: Sp.gr. 0.78510; m.p. —112.3°C.; b.p. 78.4°C.
Soluble in water, methyl alcohol and ether.
Derivation: Alcohol is prepared by fermentation of the sugars derived from starch by conversion with diastase, or of molasses, etc. Yeasts (saccharomycetes) decompose them into alcohol and carbon dioxide. When yeast is added to a solution of cane sugar, hydrolysis into dextrose and levulose first occurs, followed by the immediate decomposition of the dextrose and levulose by the enzyme of the starch into alcohol and carbon dioxide. The alcohol is separated from the water and other products of fermentation by distillation and purified by further fractional distillation. The manufacture of ethyl alcohol from wood waste and from waste liquors of the sulfite pulp process is being carried on commercially on a small scale. Synthetic alcohol from ethylene gas is now on a commercial basis.
Impurities: Higher alcohols, empyreumatic substances, esters, etc.
Method of purification: Filtration through wood charcoal or bone-black and repeated distillation.
Grades: Technical; U.S.P. (the pharmacopoeia permits 1% water); absolute alcohol (an alcohol which has been dehydrated to 99.8% by distillation with a water-removing substance, such as lime, sodium, etc.); proof spirit (U. S.: a dilute alcohol containing 42.52% of alcohol by weight, or 50% by volume; Great Britain: a dilute alcohol containing 49.24% of alcohol by weight or 57.06% by volume); under-proof (U.P.) and over-proof (O.P.) spirit are respectively weaker and stronger than proof spirit; denatured alcohol (See special heading, Denatured alcohol.); rectified spirit (an alcohol containing 95% or more of pure alcohol); Cologne spirit (a very pure distillate containing 95 to 96% of alcohol).
Uses for undenatured ethyl alcohol: Used mainly in pharmaceuticals, flavoring extracts and the like, where the alcohol is used in a legal medicinal way or is a lawful constituent of food products. It is the regulation of the Government that nothing but pure ethyl alcohol shall enter into foodstuffs or medicines and there is no provision by which any type of denatured alcohol can be employed for such purposes. With the possible exception of tincture of iodine, which is for external purposes only, all preparations in the United States Pharmacopoeia must use pure ethyl alcohol. For hospitals, educational institutions and the like, which can qualify under the present regulations, pure ethyl alcohol, tax-free, can be obtained but again this use is strictly limited to the pursuit of scientific investigations and the preparation of drugs and medicines as above indicated. Here and there a perfume manufacturing house which can qualify, is using pure ethyl alcohol instead of specially denatured alcohol in the manufacture of perfumes but it should be understood that this pure ethyl alcohol is tax-paid and, of course, the consumer must bear the burden of the tax, which is $2.09 per wine gallon over and above the cost of the bulk pure alcohol.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Ethyl Aldehyde. See Acetaldehyde.

Ethyl Aminobenzoate (Benzocaine, anesthesin) $C_6H_4NH_2COOC_2H_5$.
Color and properties: Small, white or colorless crystals, or white crystalline powder, odorless. Approximately one-twentieth as toxic as cocaine.
Constants: M.p. 88° to 90°C.
Soluble in dilute acids, less so in chloroform, ether and alcohol; less so in almond oil and olive oil; with great difficulty in water.
Derivation: By heating sodium sulfide, sodium hydroxide and para-nitrobenzoic acid, cooling, acidulating, boiling and crystallizing by the addition of sodium acetate. The para-aminobenzoic acid is esterified by heating with ethyl alcohol and sulfuric acid.
Uses: Medicine (local anesthetic, burns, wounds, tuberculous laryngitis, gastric ulcer, vomiting, dentistry, eczema, hemorrhoids).
Railroad shipping regulations: None.*

Ethylaniline $C_2H_5NHC_6H_5$.
Color and properties: Colorless liquid, becoming brown on exposure to light.
Constants: Sp.gr. 0.9631; m.p. —80°C.; b.p. 206°C.
Soluble in alcohol; insoluble in water and ether.
Derivation: By heating aniline and ethyl alcohol in presence of sulfuric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Ethylbenzene (Ethylbenzol) $C_6H_5C_2H_5$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.867; m.p. —94°C.; b.p. 136°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By heating benzene and ethyl chloride in presence of aluminum chloride, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Ethyl Benzoate (Benzoic ether) $C_6H_5CO_2C_2H_5$.
Color and properties: Colorless, aromatic liquid.
Constants: Sp.gr. 1.0509; m.p. —32.7°C.; b.p. 212.9°C.
Soluble in alcohol and ether; slightly soluble in hot water.
Derivation: By heating ethyl alcohol and benzoic acid in presence of sulfuric acid.
Method of purification: Rectification.
Grades: Technical
Containers: Iron drums; glass bottles.
Uses: Flavoring extracts; perfumery.
Railroad shipping regulations: None.*

Ethylbenzol. See Ethylbenzene.

Ethylbenzylaniline $C_6H_5N(C_2H_5)CH_2C_6H_5$.
Color and properties: Clear colorless oil.
Constants: Sp.gr. 1.034; b.p. 286°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating ethyl aniline, benzyl chloride and aqueous caustic soda, with subsequent distillation.
Method of purification: Redistillation.
Grades: Technical.
Containers: Iron drums.
Uses: Dyestuffs; organic synthesis.
Railroad shipping regulations: None.*

Ethylbenzylanilinedisulfonic Acid $C_{15}H_{17}NO_6S_2$.
Color and properties: White.
Soluble in alkalis and water.
Derivation: Disulfonation of ethylbenzylaniline.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Ethyl Bromide (Bromoethane; Hydrobromic ether; Bromic ether) C_2H_5Br.
Color and properties: Colorless, inflammable, volatile liquid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 1.4384; m.p. —115.5°C.; b.p. 38.4°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: Red phosphorus is added to absolute ethyl alcohol, bromine is then slowly added to the mixture which is then distilled.
Method of purification: Rectification.
Grades: Technical.
Containers: 1 oz. sealed tubes; 1 lb. bottles; 115, 600 lb. drums.
Uses: Organic synthesis; medicine (anesthetic); refrigerant.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Ethyl Butyrate (Butyric ether) $C_3H_7CO_2C_2H_5$.
Color and properties: Colorless volatile liquid; pineapple-like odor.
Constants: Sp.gr. 0.8788; m.p. —93.3°C.; b.p. 120.6°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: Ethyl alcohol and butyric acid are heated together in presence of sulfuric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Flavoring extracts; imparting a pineapple flavor; perfumery.
Fire hazard: Dangerous.*
Railroad shipping regulations: None(?)*

Ethyl Butyrate, Iso-. See Ethyl isobutyrate.

Ethyl Caprate (Capric ether; Caprinic ether; Ethyl caprinate) $C_9H_{19}COOC_2H_5$.
Color and properties: Colorless liquid; fragrant odor.
Constants: Sp.gr. 0.870; b.p. 243°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating capric acid, absolute alcohol and sulfuric acid, with subsequent distillation.
Method of purification: Redistillation.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis; manufacturing wine-bouquet and cognac essence.
Railroad shipping regulations: None.*

Ethyl Caprinate. See Ethyl caprate.

Ethyl Caproate (Ethyl capronate; Ethyl hexoate; Caproic ether; Capronic ether) $C_5H_{11}COOC_2H_5$.
Color and properties: Colorless to yellowish liquid; pleasant odor.
Constants: Sp.gr. 0.872; b.p. 167°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating absolute alcohol, normal caproic acid in presence of sulfuric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis; artificial fruit essences.
Railroad shipping regulations: None.*

Ethyl Capronate. See Ethyl caproate.

Ethyl Caprylate (Ethyl octoate; Caprylic ether) $CH_3(CH_2)_6COOC_2H_5$.
Color and properties: Colorless liquid; pineapple odor.
Constants: Sp.gr. 0.873; m.p. —48°C.; b.p. 205° to 206°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating caprylic acid, alcohol and sulfuric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Flavoring; fruit essences.
Railroad shipping regulations: None.*

Ethyl Carbamate (Urethan; Ethylurethane) $CO(NH_2)OC_2H_5$.
Color and properties: Colorless crystals; odorless; saltpeter-like taste.
Constants: Sp.gr. 0.9862; m.p. 49°C.; b.p. 180°C.
Soluble in water, alcohol, ether, glycerol and chloroform.
Derivation: (1) By heating ethyl alcohol and urea nitrate at 120° to 130°C. (2) By action of ammonia on ethyl carbonate or ethyl chloroformate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine (sleep producer, unofficial).
Railroad shipping regulations: None.*

Ethylcarbazole.
Color and properties: Leaflets.
Constants: M.p. 67° to 68°C.
Soluble in ether and hot alcohol.
Derivation: Action of ethyl chloride on potassium carbazolate.
Grades: Technical.
Containers: Drums.
Uses: Dyes.
Railroad shipping regulations: None.*

Ethyl Carbonate (Carbonic ether; Diethylcarbonic ether) $(C_2H_5)_2CO_3$.
Color and properties: Colorless, inflammable liquid; pleasant odor.
Constants: Sp.gr. 0.978; b.p. 126°C.
Soluble in alcohol; insoluble in water.
Derivation: By the heating of ethyl iodide and silver carbonate, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron Drums.
Uses: Organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Ethyl Chloride (Hydrochloric ether; Chlorethane; Muriatic ether) C_2H_5Cl.
Color and properties: Gas at ordinary temperature; compressed, a colorless, highly inflammable, volatile liquid.
Constants: Sp.gr. 0.9214; m.p. —140.85°C.; b.p. 12.5°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: (a) By-product in the manufacture of chloral. (b) By passing hydrogen chloride into a solution of zinc chloride and ethyl alcohol.
Method of purification: Distillation.
Grades: Technical.
Containers: 10, 30, 60, 100 gram hermetically sealed tubes; 5, 10, 25, 50, 100 lb. cylinders.
Uses: Medicine and dentistry (local anesthetic); organic synthesis; refrigeration; analytical reagent; solvent for phosphorus, sulfur, fats, oils, resins and waxes; insecticides.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Ethyl Chloroacetate $CH_2ClCO_2C_2H_5$.
Color and properties: Water-white liquid.
Constants: Sp.gr. 1.1585 (20°C.); b.p. 144.2°C.
Insoluble in water.
Derivation: (a) By the action of chloroacetyl chloride on alcohol. (b) By treating chloroacetic acid with alcohol and sulfuric acid.
Method of purification: Distillation.
Containers: Bottles; carboys.
Uses: Solvent; organic synthesis.
Railroad shipping regulations: None(?)*

Ethylcarbonic Acid. See Propionic acid.

Ethyl Chlorocarbonate.
A solvent containing not less than 90% ethyl chlorocarbonate. Sp.gr. (20°/20°) not less than 1.125. Shipped in glass bottles and carboys.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ethyl Cinnamate (Cinnamic ether) $C_6H_5C_2H_2CO_2C_2H_5$.
Color and properties: Limpid, oily liquid; strawberry-like odor.
Constants: Sp.gr. 1.0546; m.p. 12°C.; b.p. 271°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating ethyl alcohol and cinnamic acid in presence of sulfuric acid.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 5, 10 lb. cans or bottles; 50 lb. carboys; 100 lb. drums.
Uses: Perfumery; flavoring extracts.
Railroad shipping regulations: None.*

Ethyl Cocoinate (Cocoinic ether; Cocoic ether; Cognac ether) $C_{13}H_{25}O_2C_2H_5$.
Color and properties: Yellow, oily liquid; odor of russet apples.
Constants: Sp.gr. 0.855.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the action of dry hydrochloric acid gas on an alcoholic solution of the fatty acids of coco-nut oil.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Flavoring cognac.
Railroad shipping regulations: None.*

Ethyl Cyanide (Propionitrile; Propanenitrile; Hydrocyanic ether) C_2H_5CN.
Color and properties: Mobile, colorless liquid; ethereal odor; poisonous!
Constants: Sp.gr. 0.7799; m.p. −103.5°C.; b.p. 97.08°C.
Soluble in alcohol and water.
Derivation: By heating barium-ethyl sulfate and potassium cyanide, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: Class B poison(?)*

Ethyl Decylate. Colorless liquid, odor of rose, used in perfumery.

Ethyl Diïodobrassidate. See Lipoiodine.

Ethyldimethylaminopentanolbenzoyl Hydrochloride. See Stovaine.

Ethylene (Olefiant gas; Bicarburetted hydrogen; Heavy carburetted hydrogen; Elayl; Ethene; Etherin) C_2H_4.
Color and properties: Colorless gas with characteristic sweet odor and taste. Inflammable.
Constants: Sp.gr. 0.5650; m.p. −169°C.; b.p. −102.5°C.
Slightly soluble in water, alcohol and ether.
Derivation: (a) By passing alcohol vapors over kaolin or alumina, or aluminum sulfate at 350° to 400°C. (b) By strongly heating a mixture of alcohol and sulfuric or phosphoric acid.
Grades: Technical.
Containers: Steel cylinders; gross weight 15, 160 lbs.; net weight 2, 25 lbs.
Uses: Organic preparations; production of mustard gas; oxy-ethylene welding and cutting of metals; medicine (to produce anesthesia, unofficial); manufacture of synthetic ethyl alcohol.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red gas label.

Ethylene Alcohol. See Ethylene glycol.

Ethylene Bromide (Dibromoethane) CH_2BrCH_2Br.
Color and properties: Colorless, volatile, emulsifiable liquid; chloroform-like odor; poisonous!
Constants: Sp.gr. 2.189; b.p. 129° to 131°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the action of bromine on ethylene gas.
Method of purification: Rectification.
Grades: Technical.
Containers: 5 lb. bottles; 20 lb. tins; 100 lb. cases (4 20 lb. tins); 175, 1,000, 2,000 lb. drums.
Uses: Organic synthesis; medicine (unofficial).
Railroad shipping regulations: None.*

Ethylene Chloride (Dichloroethane; Dutch liquid; Elayl chloride; Vinyl trichloride) CH_2ClCH_2Cl.
Color and properties: Colorless oily, liquid; chloroform-like odor; sweet taste.
Constants: Sp.gr. 1.2823; m.p. −35.3°C.; b.p. 83.7°C.
Soluble in water, alcohol and ether.
Derivation: By the action of chlorine on ethylene, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: 100, 500, 1,000 lb. drums.
Uses: Organic synthesis; solvent; manufacture of ethylene glycol; anesthetic.
Railroad shipping regulations: None(?)*

Ethylene Chlorobromide CH_2BrCH_2Cl.
Color and properties: Colorless, volatile liquid.
Constants: Sp.gr. 1.70; b.p. 107° to 108°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By action of bromine and chlorine on ethylene gas.
Method of purification: Distillation.
Grades: Technical.
Containers: 50 gal. iron drums, 750 lbs. each.
Uses: Solvent.
Railroad shipping regulations: None.*

Ethylene Chlorohydrin $ClCH_2CH_2OH$.
Color and properties: Colorless liquid; faint ethereal odor.
Constants: Sp.gr. 1.213 (20°/4°C.); m.p. −69°C.; b.p. 128.8°C (740 mm.); 42.3% constant boiling mixture sp.gr. 1.097 (15°/4°C.); b.p. 96°C. (740 mm.).
Soluble in most organic liquids and completely miscible with water.
Derivation: By action of hypochlorous acid on ethylene.
Method of purification: Rectification.
Grades: Refined.
Containers: (36 to 40% grade) bottles, jugs, carboys.
Uses: Organic synthesis; forcing the sprouting of buds and tubers.
Railroad shipping regulations: None.*

Ethylene Cyanide (Succinonitrile) $C_2H_4(CN)_2$.
Color and properties: Colorless, deliquescent crystals.
Constants: M.p. 51° to 55°C.; b.p. 158° to 160°C.
Soluble in alcohol, water and chloroform.
Derivation: By the interaction of ethylene bromide and potassium cyanide in presence of alcohol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Ethylenediamine $NH_2CH_2CH_2NH_2$.
Color and properties: Volatile, alkaline liquid; ammonia odor.
Constants: Sp.gr. 0.902°C.; b.p. 117°C.
Soluble in water.
Derivation: By heating ethylene chloride and ammonia, with subsequent distillation.
Method of purification: Redistillation.
Grades: Technical.
Containers: Iron drums.
Uses: Solvent for albumin and fibrin; medicine (non-corrosive solvent for false diphtheritic membranes, unofficial).
Railroad shipping regulations: None.*

Ethylenediamine Mercury Sulfate. See Sublamine.

Ethylenediaminetricresol. See Kresamin.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ethylenedicarboxylic Acid. See Succinic acid.

Ethylene Chlorochloride (Chloroethylene chloride; Monochlorinated Dutch liquid; Vinyl trichloride; Trichloroethane) $CH_2ClCH_2Cl_2$.
Color and properties: Colorless liquid; pleasant odor.
Constants: Sp.gr. 1.458; b.p. 114°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By the action of antimony pentachloride on vinyl chloride, with subsequent distillation. (b) By the chlorination of ethylene chloride.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis; solvent; anesthetic.
Railroad shipping regulations: None(?)*

Ethylene Dichloride CH_2ClCH_2Cl.
Color and properties: Colorless, oily liquid; pleasant chloroform-like odor; sweet taste.
Constants: Sp.gr. 1.2569 (20°/4°C.); m.p. −36°C.; b.p. 83.5°C. (760 mm.); wt. per gal. 10.53 lbs.
Soluble in the usual organic solvents; very slightly soluble in water.
Derivation: By the action of chlorine on ethylene with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Tin cans; tin-lined, steel drums; galvanized iron drums.
Uses: Solvent for oils, rubber, cellulose acetate, soaps; degreasing agent; cleaning fluid; fumigant; organic synthesis.
Fire hazard: Inflammable.*
Railroad shipping regulations: Red label.
Note: When mixed with carbon dioxide in the ratio of 7 to 8 parts of carbon dioxide to one of ethylene oxide the effectiveness as a fumigant is increased and the mixtures are reported as being non-inflammable and non-explosive. They are sold under the proprietary name of Carboxide. They are especially valuable in fumigating foods as they are not highly toxic to human beings and leave no residual odor or taste.

Ethylene Glycol (Ethylene alcohol; Glycol; Glycol alcohol; Glycohol alcohol) CH_2OHCH_2OH.
Color and properties: Clear, colorless, syrupy liquid; sweet taste; hygroscopic; lowers freezing point of water.
Constants: Sp.gr. 1.125; m.p. −12°C.; b.p. 197.37°C.
Soluble in water, alcohol and ether.
Derivation: (a) By heating ethylene chloride with a solution of an alkali carbonate or bicarbonate under pressure. (b) By heating ethylene chlorohydrin with a solution of an alkali carbonate or bicarbonate. (c) By heating ethylene chloride with sodium formate in methyl alcohol solution.
Grades: Technical.
Containers: 5, 10, 55, 110 gal. drums; tank cars. Net contents: 45, 90, 465, 930 lbs.; 8,000 gal.
Uses: Coolant in motors; antifreeze solution in automobile radiators; manufacture of low-freezing dynamite.
Railroad shipping regulations: None.*

Ethylene Glycol Ethyl Ether. See Cellosolve.

Ethyleneimine. See Piperazine.

Ethylenenaphthalene. See Acenaphthene.

Ethylenenaphthene. See Acenaphthene.

Ethylene Oxide CH_2CH_2O.
Color and properties: Highly volatile, colorless liquid; pleasant ethereal odor; mildly anesthetic.
Constants: Sp.gr. 0.887 (7°/4°C.); b.p. 10.5°C.
Soluble in the usual organic solvents and miscible with water in all proportions.
Derivation: By the action of caustic alkali on ethylene chlorohydrin.
Method of purification: Rectification.
Grades: Technical.
Containers: Steel cylinders.
Uses: Organic synthesis; fumigation.
Fire hazard: Inflammable.*
Railroad shipping regulations: Red label.

Ethylene Periodide. See Diïodoform.

Ethylenesuccinic Acid. See Succinic acid.

Ethylene Tetraiodide. See Diïodoform.

Ethylenethenyldiamine. See Lysidine.

Ethyl Ether. See Ether.

Ethylethyl Malonate (Ethyl malonic ester) $C_9H_{16}O_4$.
Color and properties: Colorless liquid; typical sweet ester odor.
Constants: B.p. 207°C.; density 1.0005 (18°C.).
Virtually insoluble in water; soluble in alcohol, ether, chloroform and benzene.
Derivation: Synthetic.
Method of purification: Distillation.
Grades: Technical; C.P.
Containers: Carboys; drums.
Uses: Intermediate.
Railroad shipping regulations: None.*

Ethyl Formate (Formic ether; Methenyl) $HCO_2C_2H_5$.
Color and properties: Mobile, colorless liquid, peach-kernel odor.
Constants: Sp.gr. 0.9231; m.p. −80.5°C.; b.p. 54.05°C.
Soluble in water, alcohol and ether.
Derivation: By heating ethyl alcohol with formic acid in presence of sulfuric acid.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Flavoring extracts; medicine.
Fire hazard: Inflammable liquid.*
Railroad shipping regulations: Red label.

Ethyl Guaiacol (Guaethol).
Color and properties: An oily liquid having an aromatic odor.
Soluble in water.
Uses: Medicine (analgesic, unofficial).
Railroad shipping regulations: None.*

Ethyl Heptine Carbonate.
A liquid possessing the odor of violet leaves. Used in perfumery.
Railroad shipping regulations: None.*

Ethyl Hexoate. See Ethyl caproate.

Ethyl Hydroxide. See Ethyl alcohol.

Ethylic Compounds. See corresponding ethyl compounds.

Ethylidene Aniline.
Color and properties: Dark red-brown, viscous liquid.
Constants: B.p. 205°C.
Soluble in gasoline and benzene; insoluble in water.
Derivation: Action of acetaldehyde on aniline.
Purification: Distillation.
Grades: Technical.
Containers: 100 lb. veneer-covered paint kits.
Uses: Accelerator for rubber vulcanization.
Railroad shipping regulations: None.*

Ethylidene Chloride (Chlorinated hydrochloric ether; Dichloroethane, alpha-) CH_3CHCl_2.
Color and properties: Colorless, neutral, mobile liquid; aromatic ethereal odor; hot saccharin taste. Non-inflammable.
Constants: Sp.gr. 1.174 (17°C.); b.p. 60°C.
Soluble in alcohol, ether, fixed and volatile oils; sparingly in water.
Uses: Medicine (anesthetic, unofficial).
Railroad shipping regulations: Red label(?)

Ethylidenediethyl Ether. See Acetal.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ethylidenedimethyl Ether. See Dimethylacetal.

Ethylidenelactic Acid. See Lactic acid.

Ethyl Iodide (Monoïodoethane; Hydriodic ether) C_2H_5I.
Color and properties: Clear, colorless liquid; turns brown on exposure to light; non-inflammable.
Constants: Sp.gr. 1.9228; m.p. —110.9°C.; b.p. 72.34°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By digesting red phosphorus with absolute ethyl alcohol, after which iodine is added. The mixture is heated under a reflux condenser and finally distilled.
Grades: Technical.
Containers: Iron drums; amber glass bottles.
Uses: Medicine (powerful anesthetic, unofficial); organic synthesis.
Railroad shipping regulations: None.*

Ethyl Isobutyrate (Isobutyric ether) $(CH_3)_2CHCOOC_2H_5$.
Color and properties: Colorless, volatile liquid.
Constants: Sp.gr. 0.889; b.p. 110° to 111°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By heating isobutyric acid and ethyl alcohol, with subsequent distillation.
Method of purification: Redistillation.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis; flavoring extracts.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Ethyl Lactate, Synthetic $CH_3CHOHCOOC_2H_5$.
Color and properties: Water-white liquid free from objectionable odor and high-boiling impurities.
Constants: Sp.gr. 1.024 to 1.036 at 20°C.; b.p. 150 to 153°C.; weight per gal. approximately 8.58 lbs.; ester value 96 to 100%; acidity equivalent to less than 0.5 mg. KOH per gram sample; water none.
Typical distillation range, American Society for Testing Materials Method D 86-26 T.

Cubic Centimeters	°C.
First Drop	115.
5	140.3
10	145.5
20	149.0
30	149.5
40	149.8
50	150.0
60	150.0
70	150.0
80	150.0
90	150.9
95	153.
End Point	165.

Containers: 5, 10, 50, 100 gal. drums; 5 gal. cans.
Uses: An unusually strong solvent for nitrocellulose and cellulose acetate.

Ethyl Malonate (Malonic ester) $C_7H_{12}O_4$.
Color and properties: A colorless liquid; typical sweet ester odor.
Constants: B.p. 198°C. at ordinary pressure; density 1.076 (0°C.).
Virtually insoluble in water; soluble in alcohol, ether, chloroform and benzene.
Derivation: By passing hydrogen chloride into cyanoacetic acid dissolved in absolute alcohol with subsequent distillation.
Method of purification: Distillation.
Grades: Technical; C.P.
Containers: Carboys; drums.
Uses: Intermediate.
Railroad shipping regulations: None.*

Ethylmalonic Acid $CH_3CH_2CH(COOH)_2$.
Color and properties: Colorless crystals.
Constants: M.p. 111.5°C.
Soluble in water, alcohol and ether.
Derivation: From alpha-bromobutyric acid heated with potassium mercuric cyanide and decomposed with potassium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Starting point in manufacture of synthetic pharmaceuticals, e.g., veronal, propanal.
Railroad shipping regulations: None.*

Ethylmalonic Ester. See Ethylethyl malonate.

Ethyl Marcaptan. See Ethyl sulfhydrate.

Ethylmethyl Ketone. See Methylethyl ketone.

Ethyl-6-methyl-2-phenylquinoline-4-carboxylate (6-Methyl-2-phenylquinoline-4-carboxylic ethyl ester; Novatophan; Neocinchophen; Neoquinophan) $C_{19}H_{17}NO_2$.
Color and properties: Pale yellow, crystalline powder; odorless and tasteless; permanent in air.
Constants: M.p. 75° to 76°C.
Nearly insoluble in water and dilute alkalis; soluble in hot alcohol and strong acids; very soluble in chloroform and ether.
Derivation: Synthetic.
Method of purification: Crystallization.
Grades: N.N.R.
Containers: Glass bottles; tin cans; paper-lined barrels.
Uses: Medicine (stimulates the kidneys so as to have a selective action on the excretion of uric acid; is also used in acute gout and in acute articular rheumatism).
Railroad shipping regulations: None.*

Ethylmorphine Hydrochloride. See Dionin.

Ethylmustard Oil. See Ethyl thiocarbimide.

Ethyl Myristinate.
Yellowish oil possessing an odor of violets. Used in perfumery as a fixative.
Railroad shipping regulations: None.*

Ethyl Nitrate (Nitric ether) $C_2H_5NO_3$.
Color and properties: Colorless, inflammable liquid; pleasant odor; sweet taste.
Constants: Sp.gr. 1.116; m.p. 112°C.; b.p. 87.6°C.
Soluble in alcohol and water; insoluble in water.
Derivation: By heating alcohol, urea nitrate and nitric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Ethyl Nitrite (Nitrous ether; Hyponitrous ether) $C_2H_5NO_2$.
Color and properties: Yellowish, highly aromatic, ethereal, inflammable, exceedingly volatile liquid.
Constants: Sp.gr. 0.900; b.p. 16.4°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By the action of ethyl alcohol on nitrous oxide gas. (b) By treating alcohol with alkali nitrites and sulfuric acid.
Grades: Technical; U.S.P.
Containers: Hermetically sealed tubes; 1 lb. bottles.
Uses: Organic preparations; medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Ethyl Nonylate.
A liquid having a rose-like odor. Used in perfumery.
Railroad shipping regulations: None.*

Ethyl Octoate. See Ethyl caprylate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ethyl-ortho-amino-para-cresol $C_9H_{13}NO$.
Color and properties: White.
Constants: Freezing point 94.5° to 95°C.
Soluble in caustic soda, hot benzene and toluene.
Derivation: From ethyl-ortho-toluidine-para-sulfonic acid.
Method of purification: Crystallization or distillation.
Grades: Technical.
Uses: Dyes.
Railroad shipping regulations: None.*

Ethyl-ortho-toluidine $C_6H_4(CH_3)NH_2C_2H_5$.
Color and properties: Colorless to yellowish oil.
Constants: Sp.gr. 0.9534; b.p. 214°C.
Soluble in alcohol, ether and hydrochloric acid; insoluble in water.
Derivation: By heating ethyl alcohol with ortho-toluidine and hydrochloric acid.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Dyes; intermediates.
Railroad shipping regulations: None.*

Ethyl-ortho-toluidine-para-sulfonic Acid $C_9H_{13}NO_3S$.
Color and properties: White solid.
Soluble in alkaline solution, slightly soluble in water.
Derivation: Sulfonation of ethyl-ortho-toluidine.
Method of purification: Recrystallization.
Grades: Technical
Uses: Dyes.
Railroad shipping regulations: None.*

Ethyl Oxalate (Diethyl oxalate; Oxalic ether) $(COOC_2H_5)_2$.
Color and properties: Colorless, oily, aromatic liquid.
Constants: Market grade, at least 97% ester; sp.gr. 1.077 at 20°/20°C.; 8.96 lbs. per gal. at 20°/20°C.; acidity as oxalic acid not more than 0.1%.
Miscible in all proportions with alcohol, ether, ethyl acetate, and other common organic solvents; only very slightly soluble in water.
Derivation: Esterification of oxalic acid.
Method of purification: Distillation.
Grades: Technical, 96 to 100% diethyl oxalate.
Containers: Glass bottles, steel or tin-lined drums.
Uses: Lacquers; dyes; organic synthesis.
Railroad shipping regulations: None.*

Ethyl Oxide. See Ether.

Ethyl Oxybutyrate, Synthetic $(CH_3)_2COHCOOC_2H_5$.
Color and properties: Water-white liquid, highly resistant to hydrolysis. Free from objectionable odors.
Constants: Sp.gr. 0.978 to 0.986 at 20°C.; b.p. 144° to 146°C.; weight per gal. approximately 8.18 lbs.; ester value 96 to 100%; acidity equivalent to less than 0.3 mg. KOH per gram sample; water none.
Typical Distillation Range, American Society for Testing Materials Method D 86-26-T.

Cubic Centimeters	°C.
First Drop	137.8
5	142.1
10	144.0
20	145.2
30	145.5
40	145.5
50	145.5
60	145.5
70	145.5
80	145.7
90	145.7
95	146.0
End Point	147.0

Grades: Technical.
Uses: Solvent for nitrocellulose and cellulose acetate.

Ethyl-para-aminobenzoate (Anesthesin; Benzocaine) $C_6H_4NH_2CO_2.C_2H_5$.
Color and properties: White, crystalline, odorless, tasteless powder.
Constants: M.p. 90° to 91°C.
Soluble in alcohol, ether, benzene and fatty oils; very slightly soluble in water.
Derivation: By the ethylation of para-nitrobenzoic acid, followed by reduction.
Method of purification: Recrystallization.
Grades: Technical; pure.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ethyl Phenylacetate.
A liquid of honey-like odor, used in perfumery.
Railroad shipping regulations: None.*

Ethyl Phenylcarbamate (Carbamilic ether). $OC_2H_5CONHC_6H_5$.
Color and properties: White, crystalline product; aromatic odor, clove-like taste.
Constants: M.p. 51°C.
Soluble in alcohol, ether and boiling water; insoluble in cold water.
Derivation: By the action of ethyl ether on aniline.
Uses: Medicine (used with varying results as antiseptic for ulcers, in chronic ophthalmia and rheumatism, unofficial).
Railroad shipping regulations: None.*

Ethyl Phthalate.
Colorless, odorless liquid.
Uses: Perfumery (solvent for artificial musk); denaturant for alcohol.
Railroad shipping regulations: None.*

Ethyl Propionate (Propionic ether) $C_2H_5COOC_2H_5$.
Color and properties: Practically water white.
Constants: Sp.gr. 0.895 (15.5°C.); boiling range 90° to 110°C.
Soluble in alcohol and ether; in water 2.5% at 15°C.
Derivation: By treating ethyl alcohol with propionic acid.
Method of purification: Distillation.
Grades: Commercial, 85 to 90% ester content.
Containers: 50, 100 gal. drums.
Uses: Nitrocellulose solvent.
Fire hazard: Inflammable.*
Railroad shipping regulations: Red label(?)*

Ethylpropionyl. See Diethylketone.

Ethyl Sulfate. See Ethylsulfuric acid.

Ethyl Sulfhydrate (Ethyl mercaptan) C_2H_5SH.
Color and properties: Colorless liquid; penetrating garlic-like odor.
Constants: Sp.gr. 0.83907 (20°/4°C.); b.p. 36.2°C.; m.p. 12°C.
Slightly soluble in water.
Derivation: By saturating KOH solution with H_2S, mixing with $Ca(C_2H_5SO_4)_2$ solution and distilling on a water bath.
Railroad shipping regulations: Red label(?)*

Ethyl Sulfide (Diethyl sulfide) $(C_2H_5)_2S$.
Color and properties: Colorless, oily liquid; garlic-like odor.
Constants: Sp.gr. 0.837; m.p. —99.5°C.; b.p. 92° to 93°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By heating potassium-ethyl sulfate and potassium sulfide, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Ethylsulfuric Acid (Sulfethylic acid; Sulfovinic acid; Ethyl sulfate) $C_2H_5HSO_4$.
Color and properties: Colorless, oily liquid.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 1.316; b.p. 280°C.
Soluble in water, alcohol and ether.
Derivation: By the action of sulfuric acid on ethyl alcohol.
Method of purification: Distillation.
Grades: Technical.
Containers: Glass bottles; carboys.
Uses: Medicines; precipitant for casein; organic preparations.
Railroad shipping regulations: White label.

Ethylsulfurous Acid (Sulfovinous acid) $C_2H_5HSO_3$.
Color and properties: Crystalline, unstable mass.
Soluble in alcohol, ether and alkalis.
Derivation: By the action of thionyl chloride on ethyl alcohol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Ethyl Thiocarbimide (Ethylmustard oil) C_2H_5NCS.
Color and properties: Colorless liquid; pungent odor; inflames the skin.
Constants: Sp.gr. 0.9952; b.p. 131° to 132°C.
Soluble in alcohol; insoluble in water.
Derivation: By the interaction of thiocyanic ether and phosphorus pentachloride, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ethyl Urethane. See Ethyl carbamate.

Ethyl Valerate. See Ethyl valeriate.

Ethyl Valerianate. See Ethyl valeriate.

Ethyl Valeriate (Valerianic ether; Ethyl valerate) $C_5H_9O_2C_2H_5$.
Color and properties: Colorless liquid; pleasant, fruity odor; characteristic valeric taste.
Constants: Sp.gr. 0.8765; b.p. 144.5°C.
Soluble in water, alcohol and ether.
Derivation: By heating sodium valeriate and ethyl alcohol in presence of sulfuric acid or hydrochloric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: Iron drums; 1, 5, 10 lb. bottles.
Uses: Essential oils; perfumery; artificial fruit essences; medicine (unofficial, asthmatic complaints).
Railroad shipping regulations; None.*

Eubornyl. See Brovalol.

Eucaine, Beta- (Benzoylvinyldiacetonealkamine) $C_{15}H_{21}NO_2$.
Color and properties: White crystals.
Constants: M.p. 78°C.
Derivation: By action of diacetonamine with paraldehyde and metallic sodium and treating this product with benzoyl chloride.
Uses: Medicine (local anesthetic, in form of hydrochloride (q.v.).
Railroad shipping regulations: None.*

Eucaine Hydrochloride, Beta- (Benzoylvinylacetonealkamine hydrochloride) $C_{15}H_{21}NO_2.HCl$.
Color and properties: White crystals.
Constants: M.p. 268°C.
Soluble in water, alcohol and ether.
Derivation: By the action of hydrochloric acid on beta-eucaine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (local anesthetic).
Railroad shipping regulations: None.*

Eucaine Lactate. See Benzamine lactate.

Eucalyptol (Cineole; Cajeputol) $C_{10}H_{18}O$.
Color and properties: Colorless oil, camphor-like odor.
Constants: Sp.gr. 0.921 to 0.923 at 25°C.; b.p. 174° to 177°C.; congealing pt. not below 0°C.
Slightly soluble in water; miscible with alcohol, chloroform, ether, glacial acetic acid and fixed or volatile oils.
Derivation: By fractionally distilling eucalyptus oil, followed by freezing.
Method of purification: Rectification or crystallizing by freezing.
Grades: Technical; U.S.P.
Containers: 1, 5, 10 lb. bottles; 25 lb. cans; 100 lb. drums.
Uses: Pharmacy; flavoring.
Railroad shipping regulations: None.*

Eucalyptus (Blue gum tree leaves; Australian fever tree leaves).
Dried leaves of tree Eucalyptus globulus.
Habitat: Australia; cultivated in subtropics, Europe, northern Africa, southwestern United States.
Grades: N.F.
Uses: Source of Eucalyptus oil.
Railroad shipping regulations: None.*

Eucalyptus Gum. See Eucalyptus kino.

Eucalyptus Kino (Eucalyptus gum; Australian kino).
Color and properties: (a) Unground, dark reddish-brown grains or with the thin layers a transparent ruby-red color; angular masses; slight odor; very astringent taste. (b) Powdered, dark reddish-brown; in angular fragments with a conchoidal fracture, the thinner pieces light yellow or light reddish-brown; slight odor; very astringent taste.
Soluble in alcohol (90%), water (80%).
Derivation: Dried gummy exudation from Eucalyptus rostrata, Schlecht, and other species of Eucalyptus (Fam. Myrtaceae).
Uses: Medicine (astringent for diarrheas of relaxation, leucorrhea, passive hemorrhages, relaxed conditions of pharynx).

Eucalyptus Oil.
Color and properties: Colorless or faintly yellowish, mobile, essential oil; aromatic cineole odor; pungent, spicy and cooling taste. Crude oil produces an irritation which causes coughing. Such is not the case with well rectified oils.
Chief known constituents: Phellandrene, cineole, citral, pinene, terpenes. Considerable variation in constituents of various species; thus, some are phellandrene free, others are almost cineole free.
Constants:
Commercial globulus oil:
Sp.gr. 0.910 to 0.930 at 15°C.; optical rotation dextrogyrate to +15°; refractive index 1.460 to 1.469.
Soluble in 2 to 3 vols. and more of 70% alcohol.
Crude globulus oil:
Sp.gr. 0.913 at 15°C.; optical rotation dextrogyrate to +9.2°; refractive index 1.470; acid value 1.1; ester value 1.
Soluble in 1.5 vols. of 70% alcohol.
Tasmanian amygdalina oil:
Sp.gr. 0.8668 to 0.8848 at 15°C.; optical rotation −59° 1′ to −75° 1′; refractive index 1.4761 to 1.4790; saponification value 2.9 to 3.2.
Soluble in 7 vols. of 70% alcohol.
Note: The specific gravity of the oil increases with the cineole content while the angle of rotation decreases.
Derivation: Distilled from the fresh leaves of various species of the genus Eucalyptus (Fam. Myrtaceae). The oil mostly found in commerce is from Eucalyptus globulus, Lab. Production: United States (California), Australia, France, Italy, Africa, Mexico, India.
Method of purification: Rectification.
Grades: U.S.P.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: 1, 5, 10 lb. bottles; cases.
Uses: Medicine; flotation process of ore concentration; perfumes; soap.
Railroad shipping regulations: None.*

Eucalyptus Resin Oil. See Eucalyptus tar.

Eucalyptus Tar (Eucalyptus resin oil).
The residue obtained when, following the distillation of eucalyptus leaves, the oil is treated with caustic soda. It consists of a dark brown syrup.
Uses: Disinfectant; perfuming soaps.
Railroad shipping regulations: None.*

Eucasin (Casein-ammonia).
Color and properties: Fine white powder.
Derivation: By passing ammonia gas over casein.
Soluble in warm water.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Eucatropine. See 1:2:6:6-Tetramethyl-4-mandeloxypiperidine hydrochloride.

Euclase $Be(AlOH)SiO_4$.
A natural basic aluminum-glucinum silicate.
Colorless, light blue or green. Vitreous luster.
Constants: Sp.gr. 3.05 to 3.10; hardness 7.5.
Occurrence: Austria, Russia, Brazil, Peru, Tasmania.
Uses: Gem stones.

Eucodal (Dihydro-oxycodeinone hydrochloride) $C_{18}H_{21}NO_4.HCl$.
Constants: M.p. 270°C.
Uses: Medicine (substitute for morphine, giving quicker action, unofficial).
Railroad shipping regulations: None.*

Eucodin (Codeine bromomethylate) $C_{18}H_{21}O_3N(BrCH_3)$.
Color and properties: Crystalline powder.
Constants: M.p. 261°C.
Soluble in water.
Uses: Medicine (analgesic, respiratory stimulant, phthisis, bronchitis, coughs, unofficial).
Railroad shipping regulations: None.*

Eucol (Guaiacol acetate) $C_6H_4(OCH_3)_2CO$.
Color and properties: Colorless liquid; less toxic and irritant than guaiacol.
Constants: Sp.gr. 1.138; b.p. 238°C. (partial decomposition).
Soluble in olive oil; miscible in all proportions with ether and alcohol.
Uses: Medicine (guaiacol substitute, unofficial).
Railroad shipping regulations: None.*

Eudoxine (Bismuth tetraiodophenolphthalate) $(C_6H_2I_2OBi_2)_3COC_6H_4O$.
Color and properties: Reddish-yellow powder, odorless, tasteless. Decomposed by alkalis yielding bismuth oxide and a soluble salt of tetraiodophenolphthalein. Contains 52.9% iodine and 14.5% bismuth.
Insoluble in water.
Uses: Medicine (antiseptic, unofficial).
Railroad shipping regulations: None.*

Euformol. A formaldehyde-dextrin compound used in medicine. Unofficial. See also Dextroform.

Eugenic Acid. See Eugenol.

Eugenol (Para-oxy-meta-methoxyallylbenzene; Eugenic acid; Caryophyllic acid) $C_3H_5C_6H_3(OH)OCH_3$.
Color and properties: Colorless or yellowish, oily liquid, becomes brown in the air, spicy odor.
Constants: Sp. gr. 1.0696; b.p. 253.5°C.
Soluble in alcohol, chloroform, ether and volatile oils; very slightly soluble in water.
Derivation: By extraction of clove oil with aqueous potash, liberation with acid and rectification in a stream of carbon dioxide.
Method of purification: Redistillation.
Grades: Technical; U.S.P.
Containers: 1, 5, 10, 25 lb. tins.
Uses: Perfumes; essential oils; medicine (as an active germicide); production of isoeugenol for the manufacture of vanillin.
Railroad shipping regulations: None.*

Euguform (Methylene diguaiacol, acetylized).
Color and properties: White, amorphous powder, odorless.
Insoluble in water.
Derivation: By acetylizing the condensation product of guaiacol and formaldehyde.
Uses: Medicine (substitute for orthoform, unofficial).

Eumydrin. See Atropine methylnitrate.

Eunatrol. See Sodium oleate.

Euonymit. See Dulcite.

Euonymus (Wahoo; Arrow wood; Indian arrow wood; Bitter ash; Burning bush; Strawberry tree; Spindle tree).
Dried root bark of Euonymus atropurpureus.
Habitat: United States, east of the Mississippi.
Grades: Technical; N.F.
Containers: Boxes; bags.
Uses: Medicine (as a cathartic).
Railroad shipping regulations: None.*

Eupatorin. A glucoside found in Eupatorium.

Eupatorium (Boneset; Thoroughwort).
Derivation: Dried leaves and flowering tops of Eupatorium perfoliatum.
Habitat: Canada to Florida and west to Texas and Nebraska.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (as an emetic and aperient).
Railroad shipping regulations: None.*

Eupatorium Purpureum (Trumpet weed; Queen of the meadow; Gravel root; Purple boneset).
Derivation: Root of Eupatorium purpureum.
Habitat: United States.
Grades: Technical.
Containers: Boxes; bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Euphorbia (Pill-bearing spurge; Snake weed; Cat's hair; Queensland asthma weed; Flowery-head spurge).
Whole plant, Euphorbia pilulifera or hirta.
Habitat: Queensland, India.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (treatment of asthma and bronchitis).
Railroad shipping regulations: None.*

Euphorbia Oil.
A colorless, odorless oil, insipid when fresh, speedily becoming rancid.
Soluble in alcohol and ether.
Derivation: By expression or extraction from the seeds of the plant, Euphorbia lathyris or caper spurge.
Habitat: Europe and eastern United States.
Uses: Medicine (powerful purge, unofficial).

Euphorbium.
Gum resin from Euphorbia resinfera.
Habitat: Morocco.
Grades: Technical.
Containers: Boxes.
Uses: Medicine (emetic, cathartic, veterinary vesicant).
Railroad shipping regulations: None.*

Euphorin (Phenylurethane) $(C_6H_5NH)CO(OC_2H_5)$.
Color and properties: Colorless needles or white powder; faint aromatic odor and taste.
Constants: M.p. 50° to 51°C.
Soluble in dilute alcohol and in ether; almost insoluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Medicine (anodyne, antipyretic, skin diseases, ulcers).
Railroad shipping regulations: None.*

Euphthalmine. See 1:2:6:6-Tetramethyl-4-mandeloxypiperidine hydrochloride.

Euphyllin (Theophyllin ethylene diamine).
Color and properties: White crystals containing 78% theophyllin.
Soluble in water.
Uses: Medicine (diuretic, unofficial).

Eupyrine (Carbethoxyvanillylidene-para-phenetidine) $C_2H_5OC_6H_4NCHC_6H_3(OCOOC_2H_5)OCH_3$.
Color and properties: Pale yellow needles; tasteless, vanillin odor.
Constants: M.p. 87°C.
Insoluble in water; sparingly in cold, but very soluble in warm alcohol, ether, chloroform.
Uses: Medicine (antipyretic, unofficial).
Railroad shipping regulations: None.*

Euresol. See Resorcinol acetate.

Europhen (Diïsobutyl-ortho-creosoliodide).
Color and properties: Light yellow, amorphous powder; faint aromatic odor; tasteless. Contains approximately 28.1% iodine. As powerful as iodoform but five times lighter and less toxic.
Constants: M.p. 110°C.
Soluble in ether, chloroform, collodion, alcohol and fixed oils; insoluble in water and glycerol.
Derivation: Action of iodine on isobutyl-orthocresol in alkaline solution.
Uses: Medicine (treatment of chancres, syphilitic ulcers, burns, psoriasis, eczema, and other skin diseases, rhinitis, laryngeal tuberculosis, unofficial).
Railroad shipping regulations: None.*

Europia. See Europium oxide.

Europium Eu. One of the rare earth (q.v.) metals.

Europium Chloride $EuCl_3$.
Color and properties: Fine yellow needles.
Derivation: By heating the hydrated chloride in a mixture of chlorine and sulfur chloride.
Soluble in water.
Railroad shipping regulations: None.*

Europium Oxide (Europia) Eu_2O_3.
Color and properties: Pink powder.
Constants: Sp.gr. from the oxalate 7.42 (15°/4°); from the nitrate 6.55 (15°/4°).
Derivation: (a) By heating the sulfate at 1,600°C.; (b) by heating the nitrate at 900°C.
Railroad shipping regulations: None.*
See also Rare earths.

Europium Sulfate $Eu_2(SO_4)_3.8H_2O$.
Color and properties: Pale pink crystals, stable in air, completely dehydrated at 375°C.
Railroad shipping regulations: None.*

Eutectic Alloys. See table under Fusible metals.

Euxenite (Loranskite).
One of the rare earth minerals (q.v.). It contains 35.09% columbium oxide, 21.16% titanium oxide, 27.48% yttria, 3.40% erbia, 3.17% ceria, 4.78% uranium oxide, 1.38% iron oxide. Color, brownish-black.
Constants: Sp.gr. 4.7 to 5.0; hardness 6.5.
Occurrence: United States (North Carolina), Norway, Switzerland.

Everdur. A non-ferrous alloy containing 94.8 to 96% copper, 3 to 4% silicon, 1 to 1.2% manganese. It offers good resistance to cold sulfuric acid up to 95% concentration, and hot sulfuric acid up to 50% in the absence of oxidizing agents. It is also resistant to cold hydrochloric acid in all strengths in the absence of air and to hot hydrochloric acid up to 20% concentration at 150°F. in the absence of air. It is resistant to acetic acid in the absence of air, to hot or cold sodium hydroxide up to 50% concentration and to sea water and moist sulfurous atmospheres.

Everitt's Salt $KFe(CN)_3$.
Color and properties: Yellowish-white to green powder.
Derivation: Portion of residue remaining when hydrocyanic acid gas is prepared by decomposing potassium ferrocyanide with sulfuric acid.
Railroad shipping regulations: None.*

Exalgin. See Methyl acetanilide.

European Ash. See Fraxinus excelsior.

European Centaury. See Erythraea.

European Huckleberry. See Vaccinium.

"Excelsior" Black. See under Blacks.

Exodin.
Color and properties: Yellow powder, odorless, tasteless. A mixture of rufigallichexamethyl ether (30%), diacetylrufigallictetramethyl ether (23%), and acetylrufigallicpentamethyl ether (47%).
Constants: M.p. 180° to 190°C.
Insoluble in water.
Uses: Medicine (synthetic cathartic, unofficial).
Railroad shipping regulations: None.*

"Exolon." Proprietary name for an abrasive, made in the electric furnace.

Explosives. Flameless. See Explosives, safety.

Explosives, High.
Explosives stronger or more sudden in action than gunpowder. See Dynamite; Dynamite, gelatin; Gelatin, explosive; Nitroglycerin, and other specific explosives.

Explosives, Miscellaneous. The following list of explosives has been gathered from the literature and no attempt has been made to check the accuracy of the given percentage compositions. With some exceptions they consist, for the most part, of European explosives, many of them now out of date and no longer in use; consequently, the value of the compilation rests more on its historical side than on its application to present American commercial practice. Those interested in explosives literature research will undoubtedly find it very useful.

Abbcite No. 2. Composed of ammonium nitrate (56.5 to 59.5 parts), nitroglycerin (7.5 to 9.5 parts), dinitrotoluene (0.5 to 2.5 parts), sodium chloride (22 to 24 parts), dried meal (7 to 9 parts).

Abelite.
No. 1. Ammonium nitrate, trinitrotoluene, dinitrobenzene, sodium chloride.
No. 4. Ammonium nitrate, trinitrotoluene, starch, sodium chloride.

Ajax Powder. Composed of wood flour, potassium perchlorate, nitroglycerin, ammonium oxalate, small quantities of collodion cotton and nitrotoluenes.

Amatol. An English explosive consisting of a mixture of trinitrotoluene and ammonium nitrate.

Amberite. A smokeless powder composed of 71% nitrocotton, 18.6% barium nitrate, 5.8% vaseline, 1.3% potassium nitrate, 1.4% wood flour.

Amide Powder. A cannon powder consisting of 40% potassium nitrate, 38% ammonium nitrate and 22% charcoal.

Amidogene. Composed of 73% potassium nitrate, and 1% magnesium sulfate in one-third the weight of water; to which is added 10% sulfur, 8% charcoal and 8% bran.

Ammonals. Ammonium nitrate explosives containing powdered aluminum. Ripping ammonal is composed of 84 to 87% ammonium nitrate, 7 to 9% aluminum, 3 to 4% potassium bichromate, and 2 to 3% charcoal.

Ammon-Carbonite. Composed of ammonium nitrate, nitroglycerin, collodion wool and flour.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ammon-Dynamite. A French explosive composed of 40% ammonium nitrate, 40% nitroglycerin, 10% sodium nitrate, 10% wood flour.

Ammondyne. Composed of 45 to 51% ammonium nitrate, 17 to 19% ammonium oxalate, 9 to 11% nitroglycerin, 8 to 10% sodium nitrate and 11 to 13% wood flour.

Ammon-Foerdite I. Composed of ammonium nitrate, nitroglycerin, collodion wool, diphenylamine, glycerol, potassium chloride and flour.

Ammon-Gelatin-Dynamite. Composed of 45% ammonium nitrate, 50% nitroglycerin gelatinized with 2.5% collodion cotton, balance rye meal.

Ammon-Karbonite. Composed of about 82% ammonium nitrate, 10% potassium nitrate, 3.8% nitroglycerin, 0.2% collodion cotton and 4% meal.

Ammon-Sprenggelatin. A gelatin dynamite composed of 38 to 47% nitroglycerin gelatinized with 2 to 3% collodion cotton, 46 to 55% ammonium nitrate, 3.5 to 5% dry meal and 0.5% soda ash.

Ammonia Dynamite No. 1. A French explosive composed of 45% ammonium nitrate, 40% nitroglycerin, 5% sodium nitrate, balance wood flour.

Ammonia Dynamite No. 2. A French explosive composed of 75% ammonium nitrate, 20% nitroglycerin, balance wood flour.

Ammonia Dynamite, Pulverulent. Composed of 36% sodium nitrate, 25% ammonium nitrate, 20% nitroglycerin, balance rye flour.

Ammonia Gelatin A. Composed of 67% ammonium nitrate, 30% nitroglycerin gelatinized with 3% nitrocotton.

Ammonia Gelignite. Composed of 70% ammonium nitrate, 29.3% nitroglycerin gelatinized with 0.7% nitrocotton.

Ammonia Nitrate Powder. Composed of 80% ammonium nitrate, 10% nitroglycerin, 5% potassium chlorate, and 5% coal tar.

Ammonites. Ammonium nitrate explosives containing no nitroglycerin. Usually safety explosives (q.v.).

Amois. Composed of 90% ammonium nitrate, 5% chlorodinitrobenzene and 5% wood pulp or flour.

Amvis. One of the ammonium nitrate explosives.

Anagon Powder. Composed of 84.5% ammonium nitrate, 1.5% potassium nitrate, 8% charcoal, 5.5% powdered aluminum and 0.5% barium nitrate.

Anasite. Composed of ammonium perchlorate, myrobalans, sodium or potassium nitrates and a small amount of agar-agar.

Antigelde Sûreté. A Belgian explosive composed of about 25% nitroglycerin, 15% nitrotoluene, sodium nitrate, ammonium sulfate, and wood flour.

Antigrison. Composed of 72% ammonium nitrate, 27% nitroglycerin, balance nitrocotton.

Antgrisou Favier 11. Composed of 80.9% ammonium nitrate, 11.7% dinitronaphthalene, and 7.4% sal ammoniac.

Ardeer Powder. Composed of about 47 to 51% magnesium sulfate, 31 to 34% nitroglycerin, 4 to 6% potassium nitrate, 0.5% ammonium or calcium carbonate, balance kieselguhr.

Argus Powder. Composed principally of potassium nitrate and charcoal.

Arkite. (a) Composed of potassium nitrate, nitroglycerin, collodion cotton, ammonium oxalate and wood flour; (b) the same as (a) but containing some sodium nitrate.

Axite. A smokeless powder composed of nitroglycerin, potassium nitrate, vaseline and guncotton.

B. N. Powder. A French smokeless powder similar to Poudre B (q.v.).

Ballistite. A smokeless powder composed of about 59% collodion cotton, 40% nitroglycerin, and 1% diphenylamine.

Bellite. A series of high ammonium nitrate explosives used for coal mine purposes.
(1) Contains 83.5% ammonium nitrate, 16.5% dinitrobenzene.
(2) and (4) Composed of ammonium nitrate, dinitrobenzene and sodium chloride.
(3) Contains 93.5% ammonium nitrate, 6.5% dinitrobenzene.
Black Bellite: Contains 61% ammonium nitrate, 12% trinitrotoluene, 24% sodium chloride, balance plumbago.

Bergmann's Powder. Composed of 50% potassium chlorate, 5% pyrolusite, balance bran, sawdust or wood flour.

Blastine. Composed of sodium nitrate, dinitrotoluene, ammonium perchlorate, and paraffin wax.

Bobbinites. Two coal mine explosives: One consists of potassium nitrate, sulfur, starch, charcoal and paraffin wax. The other consists of potassium nitrate, charcoal, sulfur and a mixture of ammonium and copper sulfates.

Bram's Powder. Composed of a mixture of potassium nitrate, potassium chlorate, charcoal and oak sawdust, saturated with trinitroglycerin, the latter representing 40% of the whole.

Britonite. Composed of potassium nitrate, ammonium oxalate, nitroglycerin, balance wood flour.

Brockite. Composed of a mixture of aluminum powder and barium chlorate.

Brugère Powder. Composed of about 54% ammonium picrate and 46% potassium nitrate.

Cambrite. A smokeless powder composed of about 26 to 29% potassium nitrate, 22 to 24% nitroglycerin, 7 to 9% calcium chloride, 3 to 4.5% barium nitrate, 1% calcium carbonate, balance wood flour.

Cannel Powder. Composed of 80% ammonium perchlorate and 20% cannel coal.

Cannonite. A smokeless powder composed of about 86% nitrocotton, 6% barium nitrate, 2% potassium ferrocyanide, 1% lampblack, and 3% vaseline.

Capexco. A coal mine explosive composed of from 32 to 34% nitroglycerin, 30 to 32% ammonium oxalate, 24 to 25% sodium nitrate, 0.5 to 1.5% nitrocotton, and 8 to 10% wood flour.

Carbite. Composed of 34% potassium nitrate, 25% nitroglycerin, 1% barium nitrate, 0.5% soda ash, 1% powdered bark, and 38.5% flour.

Carboazotine. Composed of potassium nitrate, sulfur, lampblack and sawdust or wood flour.

Carbodynamite. Composed of 90% nitroglycerin and 10% cork charcoal as the absorbent.

Carbogelatin. Composed of nitrogelatin, potassium nitrate and wood flour.

Carbon Carbonite. Composed of 34% potassium nitrate, 25% nitroglycerin, 1% barium nitrate, 0.5% soda ash, 1% ground tan, 38.5% wheat flour.

Castellanos Powder. Composed of nitrobenzene, nitroglycerin, kieselguhr and a fibrous material.

Celmontite. A coal mine explosive composed of from 65.5 to 68.5% ammonium oxalate, 19.5 to 21.5% sodium chloride, and 10.5 to 12.5% trinitrotoluene.

Celtite. Composed of from 56 to 59% nitroglycerin, 17 to 21% potassium nitrate, 11 to 13% ammonium oxalate, 2 to 3.5% nitrocotton, and 8 to 9% wood flour.

Cheddites. French blasting explosives. They are composed of perchlorates and chlorates of ammonium, potassium, or sodium. In order to reduce explosive hazards they are coated with castor oil in which a nitrocompound has been dissolved.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Chilworth Powders. Composed of mixtures of potassium chlorate, potassium nitrate, charcoal and sulfur.

Chromammonite. An ammonium nitrate explosive.

Coal Carbonites.

I. 25% nitroglycerin, 30.5% sodium nitrate, 5% potassium bichromate, 39.5% rye flour.

II. 30% nitroglycerin, 24.5% sodium nitrate, 5% potassium bichromate, 40.5% rye flour.

Colliery Steelite. A coal mine explosive composed of 74% potassium chlorate, 25% oxidized resin and 1% castor oil.

Cologne Rottweiler Powder. Composed of 93% ammonium nitrate, 4.9% vegetable oil, 1.2% sulfur, and 0.9% barium nitrate.

Colonia Powder. Composed of a mixture of nitroglycerin and gunpowder. It usually runs about 30 to 35% nitroglycerin and 65 to 70% gunpowder.

Cordite MD. A British rifle powder consisting of 65% gelatinized guncotton, 30% nitroglycerin, and 5% vaseline.

Coronite. It may contain from 38 to 40% nitroglycerin, 26 to 28% ammonium nitrate, 11 to 14% aluminum stearate, 1 to 1.5% soluble guncotton, 3 to 5% potassium nitrate, 8 to 11% rye flour, 2 to 4% sawdust or wood flour, and 2 to 4% liquid paraffin.

Cremonite. Composed of about 51.15% ammonium picrate and 48.85% ammonium perchlorate.

Cresylite. A French explosive composed of trinitrocresol.

Cube Powder. A smokeless powder of the order of Imperial Schultze (q.v.).

Dahmenit A. A safety explosive composed of 91.3% ammonium nitrate, 6.5% naphthalene, and 2.2% potassium bichromate.

Densites. Composed of ammonium nitrate, trinitrotoluene, and potassium or sodium nitrates.

Designolle's Powders. Composed of potassium picrate and potassium nitrate, together with charcoal.

Donarite. Composed of about 80% ammonium nitrate, 12% trinitrotoluene, 3.8% nitroglycerin, 0.2% collodion wool, and 4% flour.

Dorfit. A German explosive composed of about 95% ammonium nitrate, balance potassium nitrate, trinitrotoluene, sodium chloride and flour.

Dreadnought Powder. Composed of about 73 to 77% ammonium nitrate, 14 to 17% sodium nitrate, 3 to 5% trinitrotoluene and 4 to 6% ammonium chloride.

Dualin. Composed of about 80% nitroglycerin, 10% potassium nitrate, and 10% sawdust or wood flour.

Dunnite. A picric acid explosive.

Duplexite. Composed of 70% potassium chlorate, 10% dinitrobenzene, 10% coal tar, and 10% charcoal.

Duxite. Composed of sodium nitrate, nitroglycerin, ammonium oxalate, collodion cotton and wood meal.

Dynamite I. A 75% dynamite, balance 25% kieselguhr.

Dynamite II. An 18% dynamite, balance 72% potassium nitrate and 10% charcoal.

Dynamite Antigrisouteuse V. A 53% dynamite containing nitroglycerin, kieselguhr and sodium sulfate.

Dynamite De Trauzl. A 75% dynamite. Composed of 75% nitroglycerin, 23% guncotton and 2% charcoal.

Dynamite, Rhenish. A 75% dynamite. Composed of 23% kieselguhr, 2% chalk or barium sulfate, and 75% solution of nitroglycerin in naphthalene.

Dynamite, Vonges. A 75% dynamite. Composed of 75% nitroglycerin, 20.8% randanite, 3.8% quartz and 0.4% magnesium carbonate.

Dynamite, Wetter. A safety explosive composed of 53% nitroglycerin, 33% magnesium sulfate, and 14% kieselguhr.

Dynamites, Ammonia. Dynamites containing ammonium nitrate as part of the dope.

Dynamites, Lignin. Nitroglycerin absorbed by a mixture of wood pulp, and a nitrate, usually sodium nitrate.

Dynammon. A 45% dynamite containing 45% nitroglycerin, 47.2% ammonium nitrate, and 7.8% lignite.

Dynammon I. Composed of 88% ammonium nitrate and 12% lignite.

Dynastite. Composed of 94% potassium chlorate and 6% barium nitrate dipped in nitrotoluene.

Dynobel. Composed of nitroglycerin, ammonium oxalate, potassium perchlorate, collodion cotton and wood flour.

E. C. Powder. A smokeless sporting powder composed of about 26% guncotton, 28% collodion cotton, 4% cellulose, 38% potassium nitrate, 2% camphor, 2% volatiles.

Earthquake Powder. Composed of about 79% potassium nitrate and 21% charcoal.

Electronites.

1. 75% ammonium nitrate, 5% barium nitrate, starch and wood flour.
2. 95% ammonium nitrate, 5% starch and wood flour.

Empire Powder. A 33 grain powder composed of a metallic nitrate, both insoluble and soluble nitrocotton, and vaseline.

Essex Powder. Composed of about 33 to 35% potassium nitrate, 22 to 24% nitroglycerin, 33 to 35% wheat flour, 5 to 7% ammonium chloride and 0.5 to 1.5% collodion cotton.

Explosif 03 (Prométhée). A French explosive made by mixing a chlorate with a small amount of manganese dioxide. This is then dipped into a mixture of turpentine, naphtha and nitrobenzene.

Explosifs Favier. *See Explosifs N.*

Explosifs N. A series of French explosives composed of mixtures of ammonium nitrate with nitronaphthalene, paraffin and resin. See also Grisounites, Grisoutine Favier, Favierite No. 1, Favierite No. 2.

Explosives, Sprengel. Made of non-explosive materials which become explosive when mixed together either at the time of use or shortly before.

Faversham Powders. One is composed of ammonium and potassium nitrates, ammonium chloride, and trinitrotoluene. Another contains about 85% ammonium nitrate, 10% dinitrobenzene, balance Trench's flame-extinguishing compound.

Favierite No. 1. A French explosive composed of about 88% ammonium nitrate and 12% dinitronaphthalene.

Favierite No. 2. A French explosed composed of about 90% Favierite No. 1 (q.v.) and 10% ammonium chloride.

Filite. Ballistite (q.v.) drawn out into cords.

Foerdite. Composed of about 37% ammonium nitrate, 25% nitroglycerin, 24% potassium chloride, 5% nitrotoluene, 4% dextrin, 3% glycerin, and 1.5% collodion wool.

Fontaine's Powder. Composed of potassium chlorate and potassium picrate.

Forcite. Composed of about 49% nitroglycerin, 38% sodium nitrate, 10% tar, 1.5% sulfur, 1% nitrocotton and 0.5% wood pulp.

Forcite No. 2. A 36% dynamite (q.v.).

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Forcite Antigrisouteuse. Composed of about 70% ammonium nitrate, 29.4% nitroglycerin, balance nitrocotton.

Forcite Extra. A 74% dynamite (q.v.).

Fordit. A German explosive made by preparing a mixture composed of 34% nitrotoluene, 32% ammonium nitrate, 24% nitroglycerin, 5% glycerol, 2% dextrin, 2% flour and 1% nitrocotton. Potassium chloride is then added in such amount as to compose 30% of the whole.

Fortis. A mixture of potassium nitrate, sulfur and tar together with small amounts of glycerol and iron sulfate.

Fractorite. Contains about 4% dextrin, 4% resin, 2% potassium bichromate, balance ammonium nitrate.

Fractorite B. Contains about 20% ammonium chloride, 2.8% dinitronaphthalene, 2.2% ammonium oxalate, balance ammonium nitrate.

Fulgurite. Composed of 60% nitroglycerin and 40% magnesium carbonate and wheat flour.

Fulmenit. Composed of about 5.5% trinitrotoluene, 4% guncotton, 2.5% paraffin oil, 1.5% charcoal, balance ammonium nitrate.

Gelatinastralite. An ammonium nitrate explosive. It contains also: Sodium nitrate and not more than 20% dinitrochlorohydrin, 5% nitroglycerin, 1% collodion cotton.

Gelatin Carbonite. Composed of 25% nitroglycerin, 0.7% collodion cotton, 7% gelatin, 42% ammonium nitrate and 25% sodium chloride.

Gelatinwetterastralite. Composed of about 40% ammonium nitrate, 16% dinitrochlorohydrin, 14% sodium chloride, 8% potato starch, 7.5% sodium nitrate, 4% nitroglycerin, 2.5% ammonium oxalate, 2% dinitrotoluene, 2% rapeseed oil, 1% nitrotoluene, 0.5% collodion cotton, 0.5% wood flour.

Gelignites. Usually 65% dynamites. They generally contain 65% gelatinized nitroglycerin and the balance absorbents, the latter being composed of about 75% potassium nitrate, 24% wood flour, and 1% soda.

Geloxite. Composed of about 54 to 64% nitroglycerin, 13 to 22% potassium nitrate, 12 to 15% ammonium oxalate, 4 to 5% nitrocotton, up to 1% red ocher, and 4 to 7% wood flour.

Gesilt. German safety explosives:
No. 1: About 30.75% gelatinized nitroglycerin, 18% sodium nitrate, 7% sodium chloride, 5.25% dinitrotoluene, 39% dextrin.
No. 2: About 30.75% gelatinized nitroglycerin, 22% ammonium nitrate, 21% sodium chloride, 5.25% dinitrotoluene, 21% dextrin.

Gesteins-Westfalit B and C. Explosives of the ammonal (q.v.) type. B. contains dinitrobenzene. C. contains dinitrotoluene.

Gestensroburite. Composed of 82.5% ammonium nitrate, 17.5% dinitrobenzene.

Gluckauf. A German safety explosive composed of ammonium nitrate, dinitrobenzene, copper oxalate and wood flour.

Gomma A and B. Italian dynamites.
A. A 92% dynamite containing 8% collodion cotton.
B. An 83% dynamite containing 5% collodion cotton.

Greener's Powder. Composed of nitrobenzene, nitrocellulose and lampblack.

Grisounites. A series of French coal mine explosives. They may contain ammonium nitrate, nitroglycerin and collodion cotton, or magnesium sulfate may replace the ammonium nitrate. Others are composed of ammonium nitrate and nitronaphthalene.

Grisoutine Favier. A French explosive composed of about 69.5% ammonium nitrate, 29% nitroglycerin, 0.9% collodion cotton and 0.5% soda ash.

Grisoutite. A French explosive composed of about 53% nitroglycerin, 32.5% magnesium sulfate, and 14.5% kieselguhr.

Haloxylin. Composed of 75% potassium nitrate, 15% sawdust, 8% charcoal, 2% potassium ferricyanide.

Haylites. British explosives.
No. 1. Composed of 25 to 27% nitroglycerin, 0.5 to 1.5% collodion cotton, 19 to 21% potassium nitrate, 19 to 21% barium nitrate, 12 to 14% wood meal, 6 to 8% mineral jelly and 10 to 12% ammonium oxalate.
No. 3. Composed of 60% ammonium nitrate, 9.5% nitroglycerin, 19.5% sodium chloride, 5% ammonium oxalate, 5% wood meal.

Hebler Powder. Composed of ammonium nitrate, potassium nitrate, sulfur and charcoal.

Hellhoffite. A solution of dinitrobenzene in nitric acid.

Hirschmarke Powder. A sporting powder composed of about 78% potassium nitrate, 12% charcoal, 10% sulfur.

Holoklastite. Similar to Petroklastite (q.v.).

Imperial Schultze Powder. A smokeless powder composed of about 80% nitrolignin, 10% barium nitrate and 8% vaseline.

Indurite. Composed of about 60% mononitrobenzene, balance guncotton which has been freed from lower nitrates.

Jahnite. A mixture of potassium nitrate, sulfur and lignite coal, together with small amounts of picric acid, potassium chlorate and calcined soda.

Judson Powder. Composed of nitroglycerin, sodium nitrate, sulfur and cannel coal.

Kentite. Composed of about 32 to 35% ammonium nitrate, an equal amount of potassium nitrate, 16 to 18% ammonium chloride, and 14 to 16% trinitrotoluene.

Kohlenkarbonit. A safety explosive composed of 25% nitroglycerin, 34% potassium nitrate, 1% barium nitrate, 0.5% soda ash and 39.5% meal.

Kohlensilesia A4. Composed of about 80% potassium chlorate, 16% resin, and 4% nitrated resin.

Kratites. Mixtures of perchlorates with nitroglycerin and nitrocellulose.

Kynoch's Smokeless Powder. Composed of about 52% nitrocotton, 19.5% dinitrotoluene, 22% barium nitrate, 1.4% potassium nitrate and 2.7% wood flour.

Ligdynite. Composed of about 25 to 27% nitroglycerin, 27 to 29% sodium nitrate, 10 to 12% sodium chloride, and 30 to 33% wood flour.

Ligdyns. South African explosives similar in composition to American straight dynamites.

Lightning Powder. A smokeless powder similar in composition to Imperial Schultze powder (q.v.).

Lithoclastite. A dynamite.

Lithofracteur. Composed of about 54% nitroglycerin, 15% barium nitrate, 17% kieselguhr, 2% wood flour, 1% bran, 4% sulfur, 2% manganese dioxide and 2% soda ash.

Lyddite. Usually consists of picric acid (87%), nitrobenzene (10%) and vaseline (3%). Some types of Lyddite contain ammonium picrate, potassium nitrate and ammonium salts of trinitro-cresol.

Macarite. A mixture of lead nitrate and trinitrotoluene.

Manlianite. Contains 72% ammonium perchlorate, 14.75% charcoal, balance sulfur.

Mataziette. A mixture of nitroglycerin, sand and chalk.

Maxim Powder. Composed of both soluble and insoluble nitrocellulose, nitroglycerin and castor oil.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Maxim-Schüpphaus Powder. Composed of about 80% insoluble nitrocellulose, 19.5% soluble nitrocellulose and 0.5% urea.

M. B. Powder No. 1. A gunpowder in which part of the potassium nitrate is replaced by potassium chlorate.

M. B. Powder No. 2. A gunpowder in which ammonium perchlorate replaces part of the potassium nitrate. Sodium or barium nitrates may also be used instead of the remaining potassium nitrate.

Megadyne. A Belgian explosive composed of ammonium perchlorate, aluminum powder and paraffin wax.

Melinite. A French explosive containing 70% picric acid and 30% collodion cotton.

Melling Powder. Composed of about 51 to 55% ammonium nitrate, 18 to 20% ammonium oxalate, 11 to 13% sodium nitrate, 5 to 7% trinitrotoluene, 4 to 6% nitroglycerin, and 3 to 5% wood flour.

Minolite Antigrisouteuse. A Belgian explosive. It contains 72% ammonium nitrate, 23% sodium nitrate, 3% trinitrotoluene and 2% trinitronaphthalene.

Monachit. Contains 12% trinitroxylene, 1% charcoal and 1% collodion cotton.

Musket Powder M/71. Composed of about 76% potassium nitrate, 15% charcoal and 9% sulfur.

Negro Powder (Nigger Powder). Composed of 86 to 91% ammonium nitrate, 9 to 11% trinitrotoluene and 1 to 3% graphite.

Neonal. Composed of potassium perchlorate, nitrotoluene, nitroglycerin, ammonium oxalate and wood flour.

Neuwestfalit. Contains 70% ammonium nitrate, 17% sodium chloride, 11% dinitrotoluene, and 2% flour.

Nisser Powder. Composed of about 44.5% potassium nitrate, 10.5% potassium perchlorate, 2% potassium bichromate, 1.5% potassium ferrocyanide, 15.5% sulfur, 19.5% charcoal and 6.5% vegetable substance.

Nitroferrite. Composed of about 93% ammonium nitrate, 2% trinitronaphthalene, 2% potassium ferricyanide, 3% sugar.

Nitromagnite. A dynamite using magnesia alba as the absorbent.

Nobel Polarite. Composed of a mixture of potassium perchlorate and ammonium nitrate. It also contains trinitrotoluene, starch and wood flour.

Nobel's Ardeer Powder. Composed of 31 to 43% nitroglycerin, 11 to 14% kieselguhr, 4 to 6% potassium nitrate, and 47 to 51% crystal magnesium sulfate.

Nobel's Explosive Oil. Nitroglycerin (q.v.).

Normal Powder. A gelatinized guncotton powder.

Oxalate Blasting Powder. Composed of about 71% potassium nitrate, 15% ammonium oxalate, and 14% charcoal.

Oxyliquit. Composed of 80% liquid air, 10% burnt cork and 10% paraffin.

Panchlastite.

(a) Mixtures of liquid nitrogen tetroxide with carbon bisulfide, nitrobenzene, benzene, ether, petroleum and other hydrocarbons.

(b) Various potassium chlorate mixtures.

Permite. Composed of ammonium perchlorate, potassium chlorate, zinc dust, vaseline, pitch and sulfur.

Permonite. Composed of 42.5% ammonium nitrate, 32.5% potassium perchlorate, 10% trinitrotoluene, 10.5% starch meal, 3% wood meal, 1.5% moisture.

Pertite. An Italian picric acid explosive.

Petroclastite. See *Petroklastite.*

Petrofracteur. Composed of 67% potassium chlorate, 20% potassium nitrate, 10% nitrobenzene, 3% antimony pentasulfide.

Petroklastite. Composed of 69% sodium nitrate, 5% potassium nitrate, 10% sulfur, 15% coal tar, 1% potassium bichromate.

Phoenix I. A safety explosive composed of 30% nitroglycerin, 32% sodium nitrate, and 38% rye meal.

Picrate Powders. Various explosives of which the chief constituent is either potassium picrate or ammonium picrate.

Picric Powder. Composed of ammonium picrate and potassium nitrate.

Pit-ite No. 2. Composed of about 23 to 25% nitroglycerin, 28 to 31% potassium nitrate, 7 to 9% ammonium oxalate, and 33 to 36% wood flour.

Plastammone. Composed of ammonium nitrate, glycerol, nitrotoluene and nitrocellulose.

Plastomenite. A rifle powder composed of about 68% guncotton, 6% dinitrotoluene, 13% trinitrotoluene, and 13% barium nitrate.

Potentite. See *Tonite.*

Poudre B. A French rifle powder composed of about 68% guncotton, 29% collodion cotton, 2% vaseline, 1% volatiles.

Poudre B. N. A French rifle powder composed of about 41% guncotton, 29% collodion cotton, 19% barium nitrate, 8% potassium nitrate, 2% soda ash, 2% volatiles.

Poudre E. F. A French explosive.

Poudre J. A French sporting powder composed of about 83% guncotton and 17% ammonium bichromate.

Poudre Pyroxylée. A French sporting powder consisting of barium and potassium nitrates together with insoluble nitrocellulose.

Progressite. Contains about 89% ammonium nitrate, 6% ammonium sulfate, 4.7% aniline hydrochloride, 0.2% coloring matter.

Prométhée. See *Explosif 03.*

P. S. E. No. 15 Powder. Consists of a mixture of ammonium perchlorate and rosin.

Pyrodialite. Composed of about 80 to 88% potassium chlorate, 3 to 4% ammonium and sodium bicarbonates, 10 to 18% gas tar, and 5 to 6% charcoal.

Rackarock. Said to consist of potassium chlorate and nitrobenzene and may sometimes also contain picric acid or sulfur.

Rackarock Special. Said to be a rackarock (q.v.) containing from 12 to 16% picric acid.

Rendrock. Said to be composed of about 40% potassium nitrate, 40% nitroglycerin, 13% wood pulp and 0.7% paraffin or pitch.

Rexite. Composed of about 64 to 68% ammonium nitrate, 6.5 to 8.5% nitroglycerin, 13 to 16% sodium nitrate, 6.5 to 8.5% trinitrotoluene, and 3 to 5% wood flour.

Rexol. An explosive of the ammonium perchlorate type. It may possibly also contain potassium chlorate, rosin, zinc or aluminum and mineral oil or wax.

Rhexite. Contains 64 to 67% nitroglycerin, 18% sodium nitrate, 11% decayed wood and 4 to 7% wood flour.

Rippite.[*] Composed of from 56 to 63% nitroglycerin gelatinized with a small amount of collodion cotton, potassium nitrate, wood flour, castor oil, and ammonium oxalate, stabilized by the addition of a small amount of the carbonates of calcium or magnesium, or vaseline.

Roburites.

1. Contains 87.5% ammonium nitrate, 7% dinitrobenzene, 5% ammonium sulfate, 0.5% potassium permanganate.
2. Contains 86% ammonium nitrate, 14% chlorodinitrobenzene.
3. Contains 87% ammonium nitrate, 11% dinitrobenzene, 2% chloronaphthalene.

R. R. Powder. Composed of 98% guncotton and 2% volatiles.

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[*] *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Safety Gelatin Dynamite II. Composed of 29.6% nitroglycerin gelatinized with 0.4% collodion cotton, 32% ammonium nitrate, 6% potassium nitrate, 10% soap, 17% rye meal, 3% liquid carbohydrates and 2% wood flour.

Samsonite. Composed of nitroglycerin, collodion cotton, potassium nitrate, ammonium oxalate, and wood flour.

Saxifragin. Composed of 76% barium nitrate, 2% potassium nitrate, and 22% charcoal.

Schneiderite. Composed of 88% ammonium nitrate, 11% dinitronaphthalene and 1% resin.

Schultze Powder. A sporting powder composed of about 24% guncotton, 24% collodion cotton, 13% cellulose, 33% potassium nitrate, 4% paraffin, 2% moisture.

Schwab Powder. A rifle powder composed of about 98% guncotton, 2% volatiles.

Sekurite (Securite). Safety explosives. One variety contains 37% ammonium nitrate, 34% potassium nitrate, 29% mono- and dinitrobenzene. Another variety contains 74% ammonium nitrate and 26% dinitrobenzene.

Sengite. Similar in composition to tonite (q.v.) except that sodium nitrate replaces barium nitrate.

Shellite. Composed of ammonium perchlorate and paraffin wax.

Silesia A. Composed of 75% potassium chlorate and 25% nitrated resin.

Solenite. An Italian smokeless powder composed of 30% nitroglycerin, 40% insoluble and 30% soluble nitrocellulose.

Sprengpulver. Composed of 65 to 75% potassium nitrate, 15 to 20% charcoal and 10 to 15% sulfur.

Sprengsaltpeter. Composed of 76% sodium nitrate, 14% charcoal and 10% sulfur.

Stamford Powder. Composed of from 68 to 72% ammonium nitrate, 21 to 23% sodium nitrate, 3 to 4% trinitrotoluene and 3.5 to 4.5% ammonium chloride.

Stonite. Composed of 68% nitroglycerin, 8% potassium nitrate, 20% kieselguhr, and 4% wood flour.

Stowite. Composed of from 58 to 61% nitroglycerin, 18 to 20% potassium nitrate, 11 to 15% ammonium oxalate, 4.5 to 5% nitrocotton, 6 to 7% wood flour.

Super-Cliffite.

1. Composed of 60% ammonium nitrate, 10% nitroglycerin, 1% collodion cotton, 11% ammonium oxalate, 16% sodium chloride, and 4% wood flour.
2. Similar to No. 1 excepting that the sodium chloride is increased to 20% and the ammonium oxalate is reduced to 6%.

Super-Excellite. Composed of from 73.5 to 77% ammonium nitrate, 9 to 11% ammonium oxalate, 6.5 to 8% potassium nitrate, 3.5 to 5% nitroglycerin, and 2 to 4% wood flour.

Super-Kolax No 2. Composed of nitroglycerin, collodion cotton, potassium and barium nitrates, ammonium oxalate, starch, and wood flour.

Super-Ligdynite. Composed of 15 to 17% nitroglycerin, a like amount of ammonium nitrate, 23 to 25% sodium nitrate, 9 to 11% salt, 10 to 12% flour, and 19 to 21% wood pulp.

Super-Rippite. A smokeless powder composed of 51 to 53 parts nitroglycerin, 2 to 4 parts nitrocotton, 13.5 to 15.5 parts potassium nitrate, 15.5 to 17.5 parts dried borax, and 7 to 9 parts potassium chloride.

Superforcite. A Belgian 64% gelatin dynamite.

Superite. Composed of from 80 to 84% ammonium nitrate, 9 to 11% potassium nitrate, 3.5 to 4.5% nitroglycerin, and 2 to 5% starch.

Syndite. Composed of from 10 to 22% nitroglycerin, 0.1 to 0.3% collodion cotton, 45 to 49% ammonium nitrate, 26 to 28% sodium chloride, 7 to 9% sodium nitrate, 2 to 5% glycerol, 2 to 5% starch.

Telsit. A gelatin explosive containing from 10 to 15% di- or trinitrotoluene.

Thunderite. Composed of 4% trinitrotoluene, 4% flour, and balance ammonium nitrate.

Tonite (Potentite).

1. Composed of from 50 to 52 parts guncotton and 40 to 47 parts barium nitrate.
2. Similar to No. 1, but also containing charcoal.
3. Composed of from 18 to 20 parts guncotton, 67 to 70 parts barium nitrate, and 11 to 31 parts dinitrobenzene.

Tutol. Composed of 25% nitroglycerin, 33% potassium nitrate, 2% barium nitrate, 0.5% sodium bicarbonate, and 40% wood flour.

Tutol No. 2. Similar to rexite (q.v.) but differing from it in that 12% of the explosive base is replaced by sodium chloride and that potassium nitrate is used instead of sodium nitrate.

Walsrode Powder. A sporting powder composed of about 98.6% nitrocotton and 1.4% volatile matter.

Westfalites.

No. 1. Composed of 95% ammonium nitrate and 5% resin.

No. 2. Composed of 92% ammonium nitrate, 3% potassium nitrate, 5% resin.

No. 3. Composed of 58 to 61% ammonium nitrate, 13 to 15% potassium nitrate, 20 to 22% ammonium chloride, 4 to 6% trinitrotoluene.

Wetter Dynammon. An Austrian explosive composed of 94% ammonium nitrate, 2% potassium nitrate, and 4% charcoal.

Explosives, Permissible.

A permissible explosive is one which is similar in all respects to the sample which has passed certain tests prescribed by the United States Bureau of Mines to determine its safety for use in gassy and dusty coal mines and is permissible when used in accordance with the conditions prescribed by that bureau.

The United States Bureau of Mines † now classifies such explosives in two ways as follows: (1) On the bases of the volume of poisonous gases produced by 1½ pounds (680 grams) of the explosive, and (2) on the basis of the characteristic ingredient of each explosive.

Volume of poisonous gases: Most of the permissible explosives, even when properly and completely detonated in a drill hole in a coal mine, produce poisonous gases, but they produce at the same time a much larger volume of non-poisonous gases. In order that the poisonous gases may not under normal conditions become a menace to the lives or health of miners, no explosive is now or can become permissible if it evolves upon detonation more than 158 liters (5½ cubic feet) of permanent poisonous gases, as determined by tests in the Bichel pressure gage. Field tests of an explosive made under extreme conditions for the production of the greatest percentage of poisonous gases in the air show that in a narrow entry, with no ventilation at or near the face, a 1½-pound charge of an explosive, which gave 158 liters of poisonous gas in gage tests, produced 0.18% of carbon monoxide (the only poisonous gas present) in the air when the sample was taken two minutes after the shot. Another sample of the air taken two minutes later contained 0.08% of carbon monoxide. It is therefore evident that where ventilation is not active, as in a closed heading, miners or shot firers should not return to the face until at least five minutes after a shot. At all working faces that are difficult to ventilate, explosives of class A or class B should be used, preferably those of class A.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

The classification on the basis of the volume of poisonous gases produced by 1½ pounds (680 grams) of the explosive is as follows:

Class A. Those explosives from which the volume of poisonous gases produced is not more than 53 liters.

Class B. Those explosives from which the volume of poisonous gases is more than 53 liters but less than 106 liters, inclusive.

Class C. Those explosives in which the volume of poisonous gases is more than 106 liters but less than 158 liters, inclusive.

Characteristic ingredient:

Class 1, ammonium nitrate explosives. Characteristic ingredient is ammonium nitrate. This class is divided into two sub-classes. Subclass *a* includes every ammonium nitrate explosive that contains a sensitizer which is in itself an explosive. Subclass *b* includes every ammonium nitrate explosive that contains a sensitizer which is not in itself an explosive. The ammonium nitrate explosives of subclass *a* consist principally of ammonium nitrate with small percentages of nitroglycerin, nitrocellulose, or nitro-substitution compounds which are used as sensitizers. The ammonium nitrate explosives of subclass *b* consist principally of ammonium nitrate with small percentages of resinous matter or other non-explosive substances used as sensitizers. Ammonium nitrate explosives when fresh and properly detonated are well adapted for use in mines that are not unusually wet. They are not suitable for use in wet mines, for if the contents of a cartridge of ammonium nitrate explosive is exposed for only a few hours to the damp atmosphere the explosive may so deteriorate as to fail to detonate completely, because ammonium nitrate takes up moisture readily. The redipping of cartridges of ammonium nitrate explosives aids in protecting the contents against moisture, or moist air, and the cartridges should be so stored and handled as to preserve the efficacy of the paraffin-like coating. The explosives should be obtained in a fresh condition and purchased in such quantities as will permit their prompt use. Experience at the Pittsburgh experiment station of the Bureau of Mines shows that ammonium nitrate explosives will usually detonate completely after storage for six months in a well-ventilated magazine.

Class 2, hydrated explosives. Salts containing water of crystallization are the characteristic ingredients; they are somewhat similar in composition to the ordinary low-grade dynamites, except that one or more salts containing water of crystallization is added to reduce the flame temperature. They are easily detonated, and most of them can be used successfully in damp working places.

Class 3, organic nitrate explosives. Characteristic ingredient is an organic nitrate other than nitroglycerin. The permissible explosives now listed under class 3 are nitrostarch explosives.

Class 4, nitroglycerin explosives. Characteristic ingredient is nitroglycerin. Contain free water or an excess of carbon, which is added to reduce the flame temperature. A few explosives of this class contain salts, or an unusually low percentage of nitroglycerin, that reduce the strength and shattering effect of the explosives on detonation. The nitroglycerin explosives have the advantages of detonating easily and of not being readily affected by moisture.

Class 5, ammonium perchlorate explosives. Characteristic ingredient is ammonium perchlorate.

Class 6, gelatin explosives. Nitroglycerin is gelatinized with nitrocotton. The last class of explosives have been grouped together at the end of the list because these explosives have been specially designed for rock shooting in coal mines, although under certain conditions they have been found suitable for shooting coal also.

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Explosives, Safety.
Solid or plastic explosive mixtures possessing a satisfactory degree of safety towards fire damp. They are frequently characterized also by great safety in handling, since they require a powerful initial impulse to bring about the explosive reaction. Usually such explosives contain salts having waters of crystallization which are driven from the salts, and thus cool, reduce, or extinguish the flame.

Export Oil.
A term applied to illuminating oil, usually of 44°Bé., or lighter, exported abroad. The oil exported to England has a flash point of 73°Abel, while that exported to Germany has a flash point of 21°Celsius.

Railroad shipping regulations: None.*

Extract of Malt, U.S.P. (Maltine).
Color and properties: Light brown, sweet, viscous liquid; contains dextrin, maltose, a little glucose, and an amylolytic enzyme. It is capable of converting not less than five times its weight of starch into water-soluble sugars.

Constants: Sp.gr. not less than 1.350 and not more than 1.430 at 25°C.

Soluble in cold water, but more readily soluble in warm water.

Derivation: By infusing malt with water at 60°C., concentrating the expressed liquid at a temperature not exceeding 60°C., and adding 10%, by weight, of glycerol.

Uses: Medicine.

Railroad shipping regulations: None.*

Extracta, U.S.P. Extracts prepared according to the requirements of the United States Pharmacopoeia—pasty or semi-solid masses or dry, solid or powdered products, prepared by exhausting drugs with appropriate solvents, carefully evaporating the solutions so obtained to the prescribed consistence and adjusting the products to fixed standards. An extract is intended to preserve the useful constituents of a drug in a concentrated, relatively uniform, permanent condition and in a form suitable for medication.

Extracts, Tanning. These are now prepared from nearly all of the tannin substances by extraction with water in specially designed extracting equipment and then evaporating the tannin solution to a thick syrup or even to dryness, generally by aid of vacuum. See Chestnut; Fustic; Sumac; Gambier; Myrobalans; Larch; Hemlock; Logwood; Mangrove; Oak; Chestnut-oak; Quebracho; Quercitron; Young fustic, Palmetto; Spruce sulfite; Osage orange.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

F

F Acid. See 2-Naphthol-7-sulfonic acid and 2-Naphthylamine-7-sulfonic acid.

"F. E. Special" Black. See under Blacks.

Face Brick Clay. See under Clays.

Factice. See Factis.

Factis (Factice; Faktis; Parafactis). A term applied to rubber substitutes made from oils.

Fahlerz. See Fahlore.

Fahlore (Fahlerz; Gray copper ore).
A group of minerals consisting, essentially, of sulfantimonites or sulfarsenites of copper corresponding to the general formula $R'_3R'''S_3$, where R′ represents copper and silver, and R‴ antimony, arsenic, bismuth. Sometimes small amounts of iron and zinc (less often mercury, lead or cobalt) are also present and the formula then becomes $R'_3R'''S_{3+n}.(6R''SR'''_2S_3)$ where R″ represents iron, etc., and n is a small fraction. Thus the actual composition is extremely variable. Tetrahedrite (q.v.) is the high antimonial series, tennantite (q.v.) the high arsenical series, freibergite (q.v.) the high silver series, schwartzite (q.v.) the high mercurial series.

Fairy Gloves. See Digitalis.

Faktis. See Factis.

Falcon's Eye (Hawk's eye). Similar to tiger's eye (q.v.) but deep blue color. Used as ornamental stone.

False Galena. See Sphalerite.

False Saffron. See Carthamus.

False Topaz. See Cirtine.

False Unicorn. See Helonias.

False Unicorn Root. See Aletris.

False Winter's Bark. See Canella.

Famatinite $3Cu_2S.Sb_2S_5$. Gray mineral with tinge of brownish-red resembling freshly fractured bornite (q.v.). Black streak, metallic luster. Found with enargite (q.v.) and other copper ores.
Constants: Sp.gr. 4.5 to 4.6; hardness 3 to 4.
Occurrence: United States (Nevada), Argentine, Peru.

Faraday's Cement. See under Cements, electric.

Farfara (Coltsfoot).
Dried leaves of the perennial woolly herb, Tussilago farfara.
Habitat: Europe, northeast and north central United States.
Grades: N.F.
Uses: Medicine (demulcent).

Farina. Potato starch.

Farinose. Starch cellulose.

Farnesol.
An alcohol found in the oil of quassia flowers, palmarosa oil, cananga oil, Peru and tolu balsam.
Constants: Sp.gr. 0.985 at 15°C.; b.p. 145° to 146°C. (at 3 mm.).
Railroad shipping regulations: None.*

Fat Clay. See under Clays, Ball clay.

Fat Pitch. See Stearin and fatty acid pitches.

Fatosan. Trade name for a product used in the leather trade, as a fat liquor. It is said to be perfectly soluble in water and possesses excellent nourishing and softening properties. It is of high concentration.

Fatty Acid Pitches. See Stearin and fatty acid pitches.

Fatty Acids. See Oleic, Palmitic and Stearic acids.

Fayalite. See Olivine.

Feather Ore. See Jamesonite.

Feculose.
Name given to various commercial starch esters, which do not differ greatly, in either ordinary chemical properties or appearance from starch. Washed feculose is neutral, or slightly acid, and reacts more readily than ordinary starch with most chemical reagents.
Derivation: By the action of glacial acetic acid on starch, the product of which is washed to free it from uncombined acid. A variety of products may be obtained by varying the starch base, the concentration of the acid, and time and temperature of the reaction.
Uses: Substitute for gelatin and vegetable gums; textile finish; dressing for lace, linen and silk; dyeing; French cleaning; paper coating; confectionery.
Railroad shipping regulations: None.*

Fehling's Solution.
A reagent used in analytical work as a test for sugars. It may also be referred to as Barreswil's solution, whose work antedated Fehling's. The Association of Official Agricultural Chemists, and most of the laboratories abroad use Soxhlet's modification. The official method of preparing this solution, according to the Book of Methods of the Association of Official Agricultural Chemists, 1925 edition, is as follows:
Prepared by mixing immediately before use equal volumes of (a) and (b).
(a) Copper sulfate solution:
Dissolve 34.639 grams of copper sulfate ($CuSO_4.5H_2O$) in water, dilute to 500 cc. and filter through prepared asbestos.
(b) Alkaline tartrate solution:
Dissolve 173 grams of Rochelle salts and 50 grams of sodium hydroxide in water, dilute to 500 cc., allow to stand for two days, and filter through prepared asbestos.

Fel Bovis. See Gall, ox.

Feldspar (Felspar).
A general name for a group of abundant rock forming minerals corresponding to the general formulas $R'AlSi_3O_8$ and $R''Al_2(SiO_4)_2$ where R = potassium, sodium, calcium and less often barium, rubidium, cesium and lithium.
They may be divided crystographically as follows:
Monoclinic. Orthoclase, soda-orthoclase, barbierite, celesian, hyalophane.
Pseudo-monoclinic. Microcline, anorthoclase. cryptoclase.
Triclinic. Albite, oligoclase, labradorite, anorthite, carnegeite, andesine, bytownite.
The important ones are:

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

K	Na	Ca	NaCa
Orthoclase	Albite	Anorthite	Oligoclase
Microcline			Andesine
			Labradorite
			Bytownite

Occurrence: United States (North Carolina, Maine, Maryland, New York, Connecticut, Pennsylvania, Virginia, Georgia, New Hampshire, Vermont, California), Norway, Sweden, Italy, Canada, Russia.
Containers: Paper bags; bulk.
Uses: Pottery and enamel ware (binder and glaze), artificial teeth; opalescent glass; bond for abrasive wheels; abrasive for cleaning and polishing glass; ingredient of scouring soaps; ingredient of cements, surfacing concrete; ingredient of insulating compositions; ground for a fertilizer; ingredient of tarred roofing materials; poultry grit.
Railroad shipping regulations: None.*

Felon-grass. See Imperatoria.

Felon-wort. See Imperatoria.

Fenchone $C_{10}H_{16}O$.
Color and properties: Oil with camphor-like odor.
Constants: Sp.gr. 0.9465 (19°C.); b.p. 193°C.
Derivation: A ketone found (a) as dextro-fenchone in oil of fennel; (b) as levo-fenchone in oil of thuja.
Railroad shipping regulations: None.*

Fennel (Large fennel; Sweet fennel; Foeniculum).
Derivation: Dried, ripe fruit of cultivated varieties of Foeniculum vulgare.
Habitat: Southern Europe and western Asia; widely cultivated.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (aromatic and carminative).
Railroad shipping regulations: None.*

Fennel Oil.
Color and properties: Colorless or pale yellowish essential oil; characteristic aromatic odor; bitter, camphor-like taste changing to sweetish, mild and spicy.
Chief known constituents: Anethole, fenchone, pinene, camphene, dipentene, and phellandrene.
Constants: Sp.gr. 0.965 to 0.977 at 15°C.; b.p. 160° to 220°C.; optical rotation +11° to +20°; refractive index 1.528 to 1.538.
Solubility in alcohol: In 5 to 8 vols. of 80% alcohol; in 0.5 vols. of 90% alcohol.
Derivation: Distilled from the fruit of Foeniculum capillaceum, G.
Adulteration: Elimination of all or part of anethole content; turpentine oil; alcohol.
Containers: 1, 5, 10 lb. bottles; 25, 50 lb. tins.
Uses: Medicine; liqueurs; perfumery; soapmaking.
Railroad shipping regulations: None.*

Fennel Seed Oil. See Fennel oil.

Fenugreek (Foenum graecum).
Derivation: Seeds of Trigonella.
Habitat: Egypt, Asia Minor, France and Germany.
Grades: Technical.
Containers: Bags.
Uses: Medicine; veterinary medicine.
Railroad shipping regulations: None.*

Ferberite. See Wolframite.

Ferghanite. Probably a calcium carnotite (q.v.) found in Russia.

Fergusonite (Bragite; Tyrite; Kochelite).
A mineral which is essentially a metacolumbate and tantalate of yttrium with erbium, cerium, uranium in varying amounts. It also contains some iron and calcium. Color, brownish-black in thin scales pale to liver-brown; streak, pale brown; luster, dull but brilliantly vitreous and submetallic on fracture. Water is usually present and sometimes in considerable amount, but is not considered an original constituent; the specific gravity falls as the hydration increases. Found in granite and quartz.
Constants: Sp.gr. 4.3 to 5.8; hardness 5.5 to 6.
Occurrence: United States (Massachusetts, North Carolina, South Carolina, Texas), Sweden, Norway.
See also Rare earths.

Fermentation Alcohol. See Ethyl alcohol.

Fermented Oil. An oil obtained from fermented olives.

Fernambuco. See Lima wood.

Ferric Acetate (Iron acetate) $Fe_2(C_2H_3O_2)_6$.
Color and properties: Brownish-red crystalline scales.
Soluble in water and alcohol.
Derivation: By the action of acetic acid on iron, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Textile dyeing; medicine; dyeing leather black; wood preservative.
Railroad shipping regulations: None.*

Ferric Acetate, Basic (Iron acetate, basic) $Fe(C_2H_3O_2)_2OH$.
Color and properties: Red powder.
Soluble in alcohol and acids; insoluble in water.
Derivation: By the action of pyroligneous acid or acetic acid on iron, with subsequent crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Medicine; textile industries.
Railroad shipping regulations: None.*

Ferric Albuminate. See Iron, albuminized.

Ferric-ammonium Citrate (Iron-ammonium citrate; Ammonioferric citrate).
Color and properties: Reddish-brown, transparent, hygroscopic crystalline scales; saline taste; deliquescent in moist air.
Soluble in water; insoluble in alcohol.
Derivation: By the addition of citric acid to ferric hydroxide, then adding ammonium hydroxide, followed by filtration.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; 1, 5, 25, 50 lb. cans.
Uses: Medicine; blueprint photography.
Railroad shipping regulations: None.*

Ferric-ammonium Oxalate (Iron-ammonium oxalate; Ammonioferric oxalate) $(NH_4)_3Fe(C_2O_4)_3 . 3H_2O$.
Color and properties: Green crystals.
Soluble in water.
Derivation: By the interaction of ammonium binoxalate and ferric hydroxide.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; 1, 5, 25, 50 lb. cans.
Uses: Blueprint photography.
Railroad shipping regulations: None.*

Ferric-ammonium Sulfate (Iron-ammonium sulfate; Ammonioferric sulfate) $FeNH_4(SO_4)_2 . 12H_2O$.
Color and properties: Lilac to violet; efflorescent crystals.
Soluble in water; insoluble in alcohol.
Derivation: By mixing solutions of ferric sulfate and ammonium sulfate, followed by evaporation and crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. jars; 110 lb. kegs; 240 lb. barrels.
Uses: Medicine; analytical chemistry; textile dyeing (mordant).
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Ferric Arsenate $Fe_3(AsO_4)_2.6H_2O$.

Color and properties: Green amorphous powder.

Insoluble in water; soluble in dilute mineral acids.

Uses: Insecticide.

Railroad shipping regulations: Class B poison.

Ferric Arsenite $4Fe_2O_3As_2O_3.5H_2O$.

Color and properties: Brownish-yellow powder.

Soluble in acids, insoluble in water.

Uses: Combined with ammonium citrate (ferric ammonium citrate, q.v.) and used in medicine for the treatment of anemia and pellagra.

Railroad shipping regulations: Class B poison.

Ferric Benzoate (Iron benzoate) $Fe_2(C_7H_5O_2)_6$.

Color and properties: Brown powder.

Soluble in water, alcohol and ether.

Derivation: By the interaction of ferric hydroxide and benzoic acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Boxes; glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Ferric Bichromate (Iron dichromate; Ferric dichromate) $Fe_2(Cr_2O_7)_3$.

Color and properties: Reddish-brown granules.

Soluble in water and acids.

Derivation: By heating aqueous chromic acid and moist ferric hydroxide.

Grades: Technical.

Containers: Wooden kegs.

Uses: Preparation of pigments.

Railroad shipping regulations: None(?)*

Ferric Bromide (Ferric tribromide; Ferric sesquibromide; Iron bromide) $FeBr_3$.

Color and properties: Dark-red, deliquescent crystals.

Constants: M.p.: Sublimes.

Soluble in water, alcohol and ether.

Derivation: By the action of bromine on iron filings.

Method of purification: Crystallization.

Grades: Technical.

Containers: Boxes; glass bottles.

Uses: Medicine; analytical chemistry; bromine salts.

Railroad shipping regulations: None.*

Ferric Cacodylate.

Color and properties: Grayish-brown powder; apple-like odor.

Moderately soluble in cold water, more so in hot water, less so in alcohol.

Uses: Medicine (treatment of anemia, unofficial).

Railroad shipping regulations: None.*

Ferric Chloride (Ferric trichloride; Iron chloride; Iron sesquichloride; Iron trichloride; Flores martis; Iron perchloride) (a) $FeCl_3$; (b) $FeCl_3.6H_2O$.

Color and properties: Very deliquescent, orange-yellow crystals.

Constants:

	(a)	(b)
Specific gravity	2.804	....
Melting-point	301°C.	37°C.

Soluble in water, alcohol, ether and glycerol.

Derivation: (a) By the action of hydrochloric acid on iron oxides or ferrous carbonate, with subsequent crystallization. (b) By passing chlorine into a solution of ferrous chloride. (c) By oxidizing a solution of ferrous chloride with nitric acid.

Method of purification: Crystallization.

Grades: Technical; C.P.; U.S.P.

Containers: C.P. and U.S.P.: 1, 5 lb. bottles; 25, 50 lb. crocks. Crystals: 25 lb. jars; 25 lb. boxes; 100 lb. kegs; 100, 500 lb. drums; 200, 300, 475, 500, 600 lb. barrels. Solution: 10 lb. jugs; 20, 50 lb. demijohns; 125, 138, 140 lb. carboys.

Uses: Oxidizing agent in dye manufacture; intermediates (chlorination of organic compounds, reagent in condensation reactions); detecting blowholes and blisters in castings; disinfectant; pigments; photography; photogravure processes; reagent in analytical chemistry; chlorinating silver and copper ores; mordant in dyeing; purifying factory effluents; iron salts; medicine (in form of tincture, as astringent and blood coagulant).

Railroad shipping regulations: None.*

Ferric Chloride-antipyrine. See Ferropyrine.

Ferric Chromate (Iron chromate) $Fe_2(CrO_4)_3$.

Color and properties: Reddish-brown crystals.

Soluble in acids; insoluble in water and alcohol.

Derivation: By adding sodium chromate to a solution of a ferric salt.

Grades: Technical.

Containers: Wooden kegs.

Uses: Metallurgy; ceramics (color); paint pigment.

Railroad shipping regulations: None.*

Ferric Citrate (Iron citrate) $Fe_2(C_6H_5O_7)_2.6H_2O$.

Color and properties: Reddish-brown scales. Keep away from light.

Soluble in water and alcohol.

Derivation: By the action of citric acid on ferric hydroxide.

Method of purification: Crystallization.

Grades: Technical; U.S.P.

Containers: Amber glass bottles; 1, 5, 25 lb. cans.

Uses: Medicine (to improve the quality of the blood, unofficial); blue print paper.

Railroad shipping regulations: None.*

Ferric Dichromate. See Ferric bichromate.

Ferric Ferrocyanide (Iron ferrocyanide).

Blue pigment described under iron blues (q.v.).

Ferric Glycerophosphate. See Iron glycerophosphate.

Ferric Hydrate. See Ferric hydroxide.

Ferric Hydroxide (Ferric hydrate; Iron hydroxide; Iron sesquioxide, hydrated; Iron hydrate; Ferric sesquioxide, hydrated; Hydrated iron oxide; Hydrous iron peroxide; Hydrous ferric peroxide) $Fe(OH)_3$.

Color and properties: Brown flocculent precipitate which dries to the oxide. (See Ferric oxide, brown.)

Constants: Sp.gr. 3.4 to 3.9; m.p.: Loses H_2O at 500°C.

Soluble in acids; insoluble in water, alcohol and ether.

Derivation: Addition of ferrous sulfate solution to ammonia solution.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden barrels.

Uses: Chemical processes (absorbent); pharmaceutical preparations; water purification; manufacturing pigments; rubber pigment; antidote for arsenic poisoning.

Railroad shipping regulations: None.*

Ferric Hypophosphite (Iron hypophosphite) $Fe(PH_2O_3)_3$.

Color and properties: White or grayish-white powder; odorless; tasteless.

Soluble in water; more so in boiling water.

Derivation: By the action of hypophosphorous acid on ferrous carbonate.

Grades: N.F.

Containers: 1 lb. bottles; 1, 5, 25 lb. cans.

Uses: Medicine (iron carrier).

Railroad shipping regulations: None.*

Ferric Iodobehenate, Basic. See Ferro-sajodin.

Ferric Malate (Iron malate) $Fe_2(C_4H_4O_5)_3$.

Color and properties: Brown, hygroscopic crystals. Keep well stoppered.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in water and alcohol.
Derivation: By the interaction of ferric hydroxide and malic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Amber glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ferric Molybdate. See Molybdite.

Ferric Nitrate (Iron Nitrate) (a) $Fe_2(NO_3)_6$; (b) $Fe(NO_3)_3.6H_2O$; (c) $Fe(NO_3)_3.9H_2O$.
Color and properties: (b) Colorless cubes; (c) colorless monoclinic crystals.
Derivation: By the action of concentrated nitric acid on scrap iron or iron oxide, and crystallizing.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles.
Uses: Dyeing (mordant for buffs and blacks); medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Ferric Nucleinate. See Ferrinol.

Ferric Oleate (Iron oleate) $Fe(C_{18}H_{33}O_2)_3$.
Color and properties: Brownish-red lumps.
Soluble in alcohol, ether and acids; insoluble in water.
Derivation: By the interaction of solutions of ferrous sulfate and sodium oleate.
Grades: Technical.
Containers: Boxes; kegs.
Uses: Medicine; varnish dryer.
Railroad shipping regulations: None.*

Ferric Oxide, Black (Ferrosoferric oxide; Magnetic iron oxide; Iron ethiops; Black rouge) $FeO.Fe_2O_3$.
Color and properties: Reddish-black, amorphous powder.
Soluble in acids; insoluble in water, alcohol and ether.
Derivation: (a) Action of air, steam or carbon dioxide on iron. (b) Occurs in nature as the mineral magnetite.
Grades: Technical.
Containers: Wooden kegs.
Uses: Metallurgy; medicine; pigment; polishing compound.
Railroad shipping regulations: None.*

Ferric Oxide, Brown (Iron oxide, brown; Iron subcarbonate; Iron carbonate, precipitated) Fe_2O_3.
Color and properties: Reddish-brown powder, containing ferric carbonate with ferric hydroxide, $Fe(OH)_3$, and $Fe(OH)_2$ in varying quantities. Not a true oxide.
Soluble in acids; insoluble in water and alcohol.
Derivation: By the interaction of solution of ferrous sulfate and sodium carbonate.
Grades: Technical.
Containers: Wooden barrels.
Uses: Paint pigment.
Railroad shipping regulations: None.*

Ferric Oxide, Red (Iron oxide; Red iron trioxide; Iron sesquioxide; Crocus martis adstringens; Polishing crocus; Ferric trioxide; Purple oxide; Red oxide; Red stone). Fe_2O_3.
Color and properties: Dense dark-red powder or lumps.
Constants: Sp.gr. 5.12 to 5.24; m.p. 1,548°C.
Soluble in acids; insoluble in water.
Derivation: (a) Found in nature as hematite ore. (See Hematite, red.) (b) By calcining ferrous sulfate or oxalate. (c) By dehydrating ferric hydroxide. (d) By-product in some industries.
Grades: Technical—sold on iron oxide content and covering properties.
Containers: 100 lb. kegs; 300, 350, 450, 500 lb. barrels; 800 lb. casks.
Uses: Metallurgy; gas purification; paint pigment; polishing compounds; theatrical rouge; grease paints.
Railroad shipping regulations: None.*

Ferric Oxide, Hydrated. See Ferric hydroxide.

Ferric Oxide, Magnetic. See Ferric oxide, black.

Ferric Oxide, Yellow.
(Umber; Sienna).
Derivation: Natural mineral product, varying from bright yellow to brown.
Grades: Based on covering properties and iron oxide content.
Containers: Wooden barrels.
Uses: Pigments.
Railroad shipping regulations: None.*

Ferric Perchloride. See Ferric chloride.

Ferric Peroxide, Hydrous. See Ferric hydroxide.

Ferric Persulfate. See Ferric sulfate, basic.

Ferric Phosphate (Iron phosphate) $FePO_4.4H_2O$.
Color and properties: Yellowish-white powder.
Constants: Sp.gr. 2.87.
Insoluble in water.
Derivation: By adding a solution of sodium phosphate to a solution of ferric chloride. The product is filtered and then dried.
Grades: Technical; C.P.; U.S.P.
Containers: Precipitated: 5, 25 lb. boxes; 100 lb. kegs; 175 lb. barrels. Scales: 1 lb. bottles; 5, 10, 25, 50 lb. cans.
Uses: Medicine; fertilizers.
Railroad shipping regulations: None.*

Ferric Phosphate, Soluble.
Color and properties: Bright green crystals.
Derivation: By adding sodium phosphate to ferric citrate.
Uses: Medicine (iron carrier).
Railroad shipping regulations: None.*

Ferric-potassium Sulfate (Iron-potassium sulfate; Iron alum) $Fe_2(SO_4)_3K_2SO_4.24H_2O$.
Color and properties: Pale violet crystals.
Constants: Sp.gr. 1.806.
Soluble in water; insoluble in alcohol.
Derivation: By mixing solutions of potassium sulfate and ferric sulfate and crystallizing.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Medicine.
Railroad shipping regulations: None.*

Ferric-potassium Tartrate. See Iron-potassium tartrate.

Ferric Pyrophosphate, Soluble.
Color and properties: Apple green crystals.
Derivation: By adding sodium pyrophosphate to ferric citrate.
Uses: Medicine (iron carrier).
Railroad shipping regulations: None.*

Ferric Sesquibromide. See Ferric bromide.

Ferric Sesquichloride. See Ferric chloride.

Ferric Sesquioxide. See Ferric oxide, red.

Ferric Sesquioxide, Hydrated. See Ferric hydroxide.

Ferric Sesquisulfate. See Ferric sulfate.

Ferric-sodium Oxalate (Iron-sodium oxalate) $Na_3Fe(C_2O_4)_3.4\frac{1}{2}H_2O$.
Color and properties: Emerald-green crystals.
Soluble in water.
Derivation: By the interaction of sodium acid oxalate and ferric hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Photography.
Railroad shipping regulations: None.*

Ferric Stearate (Iron stearate) $Fe(C_{18}H_{35}O_2)_3$.
Color and properties: Light brown powder.
Soluble in alcohol and ether; insoluble in water.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the interaction of solutions of ferrous sulfate and sodium stearate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Varnish dryers.
Railroad shipping regulations: None.*

Ferric Subsulfate. See Ferric sulfate, basic.

Ferric Succinate $(C_4H_4O_4)_2Fe_2(OH)_2$.
Color and properties: Yellowish powder, becomes darker on standing.
Derivation: By addition of ferric chloride to a succinate solution.
Uses: Medicine (treatment of jaundice).
Railroad shipping regulations: None.*

Ferric Sulfate (Iron sulfate; Ferric tersulfate; Iron tersulfate; Iron sesquisulfate; Ferric sesquisulfate). (a) $Fe_2(SO_4)_3$; (b) $Fe_2(SO_4)_3 \cdot 9H_2O$.
Color and properties: Grayish-white powder.

Constants:	(a)	(b)
Specific gravity	3.097	2-2.1
Melting-point	Decomposes	Decomposes

Soluble in water.
Derivation: By adding sulfuric acid to a solution of ferrous sulfate.
Impurities: Ferrous sulfate; water; sulfuric acid.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden barrels.
Uses: Pigments; medicine; reagent in analytical chemistry; iron alum manufacture; etching aluminum; disinfectant; textiles (dyeing and calico printing); water purification.
Railroad shipping regulations: None.*

Ferric Sulfate, Basic (Basic iron sulfate; Ferric subsulfate; Monsel's salt; Ferric persulfate; Iron persulfate) $Fe_4O(SO_4)_5$.
Color and properties: Yellow, hygroscopic powder.
Derivation: By adding ferrous sulfate to hot dilute sulfuric and nitric acids and boiling until all the nitric acid is driven off and filtering if necessary.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine, in the form of a solution.
Railroad shipping regulations: None.*

Ferric Tannate (Iron tannate; Iron gallotannate) $Fe_2(C_{14}H_7O_9)(OH)_3$.
Color and properties: Dark-brown powder.
Soluble in alkalis; insoluble in water, alcohol and ether.
Derivation: By the interaction of ferric acetate and tannic acid solutions.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ferric Tantalate (Iron tantalate) $Fe_2(TaO_4)_3$.
Color and properties: Grayish-brown powder.
Insoluble in water.
Derivation: By adding sodium tantalate to a solution of a ferric salt.
Grades: Technical.
Containers: Wooden kegs.
Uses: Metallurgy.
Railroad shipping regulations: None.*

Ferric Tersulfate. See Ferric sulfate.

Ferric Tribromide. See Ferric bromide.

Ferric Trichloride. See Ferric chloride.

Ferric Trioxide. See Ferric oxide, red.

Ferric Tungstate (Iron tungstate; Iron wolframate) $Fe_2(WO_4)_3$.
Color and properties: Brown powder.
Soluble in acids; insoluble in water and alcohol.
Derivation: By adding sodium tungstate to a solution of ferric salt.
Grades: Technical.
Containers: Wooden kegs.
Uses: Metallurgy.
Railroad shipping regulations: None.*

Ferric Valeriate $Fe_2(C_5H_9O_2)_2(OH)_4$.
Color and properties: Brick-red powder with valeric odor.
Soluble in alcohol; decomposed by boiling water.
Derivation: Interaction of sodium valeriate and ferric sulfate in solution.
Uses: Medicine (for its iron content, unofficial).
Railroad shipping regulations: None.*

Ferric Vanadate (Iron vanadate) $FeVO_3$.
Color and properties: Grayish-brown powder.
Soluble in acids; insoluble in water and alcohol.
Derivation: By adding a solution of a ferric salt to the liquor obtained by leaching vanadium ores with caustic soda solution or by lixiviating the slags obtained when vanadium ores are fused with soda ash, etc.
Grades: Technical.
Containers: Wooden kegs.
Uses: Metallurgy.
Railroad shipping regulations: None.*

Ferrinol (Ferric nucleinate).
Color and properties: Brown powder; contains 6% iron.
Soluble in water.
Uses: Medicine (bactericide, unofficial).
Railroad shipping regulations: None.*

Ferripyrine. See Ferropyrine.

Ferrite.
Iron which, in pig iron or steel, has not combined with carbon to form cementite (q.v.). It is soft, ductile and relatively weak, having a tensile strength of about 39,000 lbs. and an elongation of 30% or more in 8 inches. Its electrical conductivity is about 17% that of pure copper. It can be easily magnetized, but quickly loses most of its magnetism on removal of the magnetizing force. See also Carbon, combined; Carbon, graphitic; Pearlite; Cementite.

Ferro Alloys.
Howe defines these alloys as "Iron so rich in some element other than carbon that it is used as a vehicle for introducing that element in the manufacture of iron and steel."

A number of ferro alloys is in common use. Some of them are used for the peculiar properties they impart to steel when in solid solution with the iron or when they combine, either wholly or in part, to form a carbide; others are used for the beneficial effect they have on impurities in the steel; and still others are employed to counteract harmful oxides or gases and they may not remain in the steel after solidification, but act as fluxes or scavengers of objectionable impurities.

For data on these alloys see under each specific alloy, e.g., Ferrovanadium.

Ferrobrucite. See Brucite.

Ferrochromium.
Alloys composed principally of iron and chromium used in steel manufacture. These alloys are usually classified into high and low carbon grades.

High Carbon:

Analysis:	Per Cent
Chromium	60 to 75
Carbon	4 to 8
Silicon	2 to 3

Form available: Crushed or in lumps up to 75 lbs.
Melting-point: 2,200° to 2,370°F.

Low Carbon:

Analysis:	Per Cent
Chromium	60 to 75
Carbon	0.10 to 2.00
Silicon	1.00

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Form available: Crushed or in lumps up to 25 lbs.
Melting-point: 2,500° to 2,800°F.
Uses: Where high-carbon ferrochromium is unsuitable as in low-carbon steel.
Note: Chromium is the element most commonly used in making special alloy steels. Chromium in steel affords a wide latitude in physical properties and responds so readily to heat treatment that it is often used alone in carbon steel or in combination with other elements such as nickel, vanadium, molybdenum, and tungsten. The presence of a small amount of chromium with any of these special elements accentuates their peculiar properties and makes a better steel. Some of the chromium goes into solid solution with iron in the form of a carbide, producing a steel of high tensile strength and elastic limit. Chromium also increases the resistance of the steel to impact and raises the fatigue value. The amount of chromium added to steel for structural purposes varies from 0.50 to 3.00%. When chromium is added in amounts between 12.50 to 14.00% with the carbon about 0.35%, the steel resists corrosion after being heat treated. However, if the carbon is below 0.10% and the chromium 13.00% or higher, the steel resists corrosion and oxidation in both the heat treated and untreated conditions. Steels containing the percentages of chromium as mentioned above are used for furnace parts, retorts, lead pots, cutlery and other parts requiring stainless, non-corrosive, and heat-resisting properties.
See also chrome steels under Iron and steel (Ferrum).

Ferrochrome. See Ferrochromium.

Ferroconcrete. See Concrete.

Ferromagnesite.
Derivation: By dead-burning magnesite mixed with iron ore.
Uses: Refractory linings for steel and copper furnaces.

Ferromanganese.
(a) *Standard:*
An alloy consisting principally of iron and manganese and having the following approximate analysis:

	Per Cent
Maganese	78 to 82
Iron	15 to 19
Carbon	6 to 8
Silicon (max.)	1.00
Phosphorus (max.)	0.35
Sulphur (max.)	0.05

Form available: In lumps up to 75 lbs. each. Will not disintegrate or crumble when made under the best conditions.
Melting-point: 2,280° to 2,325°F. (80% Mn).
Uses: In all grades of steel including bessemer, open-hearth and electric for forgings, rolled products and castings. Manganese combines readily with sulfur, forming manganese sulfide which is less harmful in steel than iron sulfide. Manganese is a fairly strong deoxidizer, and its oxide forms a fusible slag with other oxides, such as silicates, and has a beneficial scavenging effect. In commercial steel practice, ferromanganese is sometimes added to the ladle, resulting in a loss of from 10 to 20% manganese. When better steel is required, free from slag and nonmetallic inclusions, the ferromanganese is added to the furnace. The manganese loss in this case is from 10 to 40%, depending upon the degree of deoxidation previously done on the bath in the furnace.

(b) *Low Carbon:*
An alloy of higher manganese and lower carbon content than that described in (a). It has the following approximate analysis:

	Per Cent
Manganese	80 to 85
Silicon (max.)	1
Carbon (max.)	0.30 to 1.0
Iron	balance

Form available: In lumps up to 10 lbs. each.
Uses: As a source of manganese in a low-carbon steel.
See also Manganese steels under Iron and steel (Ferrum).

Ferromolybdenum.
An alloy composed, principally, of iron and molybdenum but marketed in two grades containing a maximum of 0.5 and a maximum of 2% carbon, respectively.
Analysis:

	Per Cent
Molybdenum	50 to 60
Sulfur	under 0.25
Silicon	1.50

Form available: Crushed, 2¼ inches and less.
Melting-point: Approximately 2,965°F.
Uses: Molybdenum in steel increases the elongation and elastic limit, also the impact and fatigue values. Molybdenum steel has a wider critical range than carbon steel and permits higher tempering temperatures. The amount of molybdenum added to steel rarely exceeds 1% and is nearly always used in combination with nickel, chromium, or vanadium. In many cases the amount is between 0.15 and 0.40%.
Note: Ferromolybdenum should never be added to steel in the ladle, but always in the furnace on account of its high melting-point. The alloy may be charged into the furnace any time during the progress of the heat.

Molybdenum steel scrap should be kept separate from other steel scrap on account of its valuable molybdenum content which may be recovered in remelting. Calcium molybdate is often used in place of ferromolybdenum. Both products are added to the furnace and the molybdenum loss in each case is from 5 to 10%.

Ferronickel Alloys.
These alloys are not to be confused with other alloys bearing the prefix "ferro-," i.e., "ferro alloys" (q.v.). Their function is not as a carrier of nickel for introduction in steel manufacture. They are definite alloys for use as such.
As the nickel content of ferronickel alloys approaches 35% the thermal expansivity, at 20°C. (68°F.) decreases rapidly. With still further increases in nickel content the expansivity again increases, at first rapidly and then more slowly, to that of pure nickel.
These curious changes are utilized in the manufacture of the following patented alloys: Invar, Elinvar, Dilver, Platinite, ADR alloy and AMF alloy.

Invar. Contains about 36% nickel, has a very low thermal expansivity at ordinary temperatures. It is very resistant to corrosion in water and may be immersed in it for days without the appearance of rust spots. It is extensively used for length measures such as tapes. Also used in construction of instruments requiring fixed distances between points to be independent of temperature, such as the bar between microscopes of a comparator for length standards. Also used in construction of clocks and watches, chronometers, etc. Quite extensively used in construction of bi-metals for thermostatic controls, etc. Lately alloys of this type have been used to compensate expansion of aluminum for such parts as piston struts, cylinder head studs, distance pieces, etc.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Elinvar. Contains about 36% nickel to which about 12% chromium has been added (or its equivalent where small percentages of manganese, tungsten or carbon are used) combines low expansivity with a practically invariable modulus of elasticity. Used for single metal balances for watches and chronometers.

Dilver possesses a coefficient of thermal expansivity nearly equal to that of glass (0.000008 per °C.).

Platinite. Contains 46% nickel and has a thermal expansivity equal to that of platinum (approximately 0.000009 per °C.). Formerly used to replace platinum for sealing in leads of electric light bulbs. Now used as a compound wire with 38% nickel core incased in copper.

ADR. This alloy possesses, in the temperature range of 0° to 500°C., a total expansion which is less than that of ordinary metals. It is used in the construction of rotary distributors.

AMF. This alloy possesses great ductility and resistance to shock at very low temperatures. Used for mechanical parts subjected to very low temperatures, as in liquid air machines.

Ferrophosphorus. Alloys of iron and phosphorus used in the steel industry for rephosphorizing steel. Produced in two grades: (a) 18% phosphorus, (b) 25% phosphorus. The 25% grade has advantages incident to one-third less alloy addition to the molten steel.

Ferropyrine (Ferripyrine; Ferric chloride-antipyrine; Iron chloride-antipyrine) $(C_{11}H_{12}N_2O)_3.Fe_2Cl_6$.

Color and properties: Red, crystalline powder, containing 64% antipyrine, 12% iron and 24% chlorine.

Constants: M.p. 220° to 225°C.

Soluble in water, alcohol and benzene; insoluble in ether.

Derivation: By mixing ferric chloride and antipyrine solutions and crystallizing.

Method of purification: Recrystallization.

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Ferro-sajodin (Ferric iodobehenate, basic) $Fe(OH)(C_{21}H_{42}ICOO)_2$, approximate formula.

Color and properties: Reddish-brown powder; odorless; tasteless; unctuous to the touch. Contains not less than 24% iodine and 5% iron.

Slightly soluble in chloroform, ether, warm fatty oils; insoluble in water, alcohol.

Uses: Medicine (anemia, rickets, syphilis, chronic bronchitis, arteriosclerosis with anemia, unofficial).

Railroad shipping regulations: None.*

Ferrosilicon.

Alloys of iron and silicon used in the steel industry. They are available in various grades, the silicon content running from 14% (in the lowest) to 94% (in the highest).

Silicon has a great solvent power for gases and a stronger affinity for oxygen than manganese. It is, therefore, used for its quieting effect upon wild or oxidized steel. It is used in effervescing steel in small doses to clean up the bath. Larger percentages of silicon are used in deoxidized steel for high-grade forgings, rolled products, and castings.

The various grades may be approximately classified as follows:

Fifteen per cent:

Analysis:	Per Cent
Silicon	14 to 16
Carbon (max.)	1
Phosphorus (max.)	0.05

Form available: In pigs up to 100 lbs.

Melting-point: Approximately 2,335°F.

Uses: When used as a furnace deoxidizer, a large portion of the silicon added is not recovered but rises out of the metal as a silicate. It is sometimes used in acid open-hearth steel for obtaining the final silicon content. In forging steels or alloy steels, it is useful as a preliminary scavenger for maintaining uniform analysis and higher recovery of elements used as final additions.

Fifty per cent:

Analysis:	Per Cent
Silicon	47 to 52
Iron	48

Form available: Crushed or in lumps up to 50 lbs. When made under the best manufacturing conditions it will not disintegrate or crumble when exposed to the air.

Melting-point: Approximately 2,480°F.

Uses: The largest tonnage of ferrosilicon used is probably in this form. Note: In acid open-hearth and acid electric-furnace practice this alloy may be added to the ladle or to the furnace. The silicon loss in each instance is approximately 5%. In basic open-hearth practice best results are obtained by adding it to the ladle in crushed form. The silicon loss varies from 10 to 30%, depending upon the degree of previous deoxidation of the bath.

Seventy-five per cent:

Analysis:	Per Cent
Silicon	75 to 79
Iron	20

Form available: Crushed or in lumps up to 50 lbs.

M.p.: Approximately 2,480°F.

Uses: For making steel of higher silicon content than the foregoing.

Ninety per cent:

Analysis:	Per Cent
Silicon	90 to 94
Iron	4.50

Form available: Crushed or in lumps up to 35 lbs.

Melting-point: 2,425° to 2,580°F.

Uses: In cases where ladle additions of cold ferro alloys must be large in order to give a high-silicon content in the steel.

Railroad shipping regulations: According to a report of the Steamboat Inspection Service there are certain hazards connected with the shipment of ferrosilicon by water. There is a disintegration of the alloy accompanied by the evolution of gas due to a reaction between moisture from the air and impurities on the surface of the alloy. The following regulations are quoted from Department of Commerce, Steamboat Inspection Service Bulletin No. 167:

1. Lots of ferrosilicon whose average silicon content lies between 48 and 65% silicon shall not be shipped on passenger vessels. No ferrosilicon shall be accepted for shipment that has been made in a furnace previously used for making calcium carbide or ferrophosphorus unless the furnace has previously been entirely relined.
2. Lots of ferrosilicon whose average silicon content lies between 45 and 48% or 65 and 70% may be shipped on passenger vessels only when a satisfactory certificate of analysis as to silicon content is supplied to the carrier, and when the carrier is satisfied that the material has been stored, in the size in which it is to be packaged and shipped, for a period of at least one month. Lump ferrosilicon shall be stored in piles not higher than 3 feet. It need not be turned over during storage. Crushed ferrosilicon (material crushed to pass a 2 inch or finer meshed screen) shall be stored in piles not

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

higher than 18 inches and the piles shall have been turned over so as to bring the material at the bottom of the pile into free contact with the air at least once during the period of storage. At least a week shall have elapsed between a turning over of the pile and packaging for shipment. The material shall not be coated with oil, paraffin or other foreign substance. If after one month's storage any odor of phosphine is noted or if the lumps of ferrosilicon can be crumbled in the hand, the carrier shall refuse shipment to such portions of the pile as are affected if they can readily be separated from unaffected portions, or in his discretion, may refuse shipment to the whole pile.

3. There shall be no restrictions upon the shipment of ferrosilicon containing less than 45% or more than 70% silicon—suitable certificate of analysis shall be required by the carrier to establish the silicon content.
4. Ferrosilicon shall be stowed on shipboard in a dry, well-ventilated place, so located and ventilated that any escaping gases cannot reach the quarters of the crew or passengers. Precautions must be taken so that waves, spray, rain or bilge water cannot come in contact with the packages or the ferrosilicon.

See also silicon steels under Iron and steel (Ferrum).

Ferroso-ferric Oxide. See Ferric oxide, black.

Ferrostyptin $(CH_2)_6H_4.HCl.FeCl_3$.
Color and properties: Yellow, crystalline powder.
Constants: M.p. 111°C.
Soluble in water, alcohol, ether and acetone.
Derivation: By the action of formaldehyde on ferric chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ferrotitanium.
Alloys composed, principally, of iron and titanium. They are used in steel manufacture. Two forms are marketed:
Ferrotitanium:
Contains approximately 25% titanium and 6% aluminum.
Ferro-carbon-titanium:
Contains approximately 17% titanium and 7% carbon.
Uses: The former can be used only in killed steels, while the latter is sometimes used as a scavenger in effervescing steels, as well as with silicon in deoxidized steels. Titanium is not an alloying element in steel, but is used as a deoxidizer and scavenger without remaining in the solid steel in more than barely appreciable amounts. In medium or high carbon killed steels it is claimed that ferro-carbon-titanium helps to secure thorough deoxidation and freedom from segregation without contamination of the steel by oxidized reaction products. It also reacts with nitrogen in such steel, forming minute pink crystals of titanium nitride. In effervescing soft steel it is claimed to produce better quality sheets with fewer blisters and other surface imperfections, on account of its scavenging action and control of the gas evolution in the ingot molds. In castings titanium is claimed to produce cleaner steel with a better structure which is more easily refined by annealing.
See also titanium steels under Iron and steel (Ferrum).

Ferrotungsten.
An alloy composed, principally, of iron and tungsten. It has the following approximate analysis:

	Per Cent
Tungsten	78 to 83
Silicon (max.)	0.75
Carbon (max.)	1.00

Form available: One inch sizes and down.
Melting-point: 3,275° to 3,450°F.
Uses: In steel manufacture. It confers great hardness and toughness at high temperatures and some steel manufacturers prefer to use it instead of tungsten powder because of its lower melting-point. High speed steels contain a wide range of tungsten, from 14 to 20%. Also used for permanent magnet steel and hack-saw steel.
Tungsten steel is made either in the crucible or electric furnace. In the crucible process tungsten powder is generally used while in the electric furnace process tungsten is generally added in the form of ferrotungsten. The use of metallic tungsten is gradually disappearing for steel work.
See also tungsten steels under Iron and steel (Ferrum).

Ferrous-ammonium Sulfate (Mohr's salt; Iron-ammonium sulfate)
$Fe(SO_4).(NH_4)_2SO_4.6H_2O$.
Color and properties: Light-green crystals.
Constants: Sp.gr. 1.865.
Soluble in water and alcohol.
Derivation: By mixing solutions of ferrous sulfate and ammonium sulfate, followed by evaporation and subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C. P.
Containers: Wooden kegs; glass bottles.
Uses: Medicine; analytical chemistry; metallurgy.
Railroad shipping regulations: None.*

Ferrous Arsenate (Iron arsenate)
$Fe_3(AsO_4)_2.6H_2O$.
Color and properties: Green, amorphous powder.
Insoluble in water.
Derivation: By the interaction of solutions of sodium arsenate and ferrous sulfate.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Medicine.
Railroad shipping regulations: Class B poison(?)*

Ferrous Bromide (Iron bromide) $FeBr_2.6H_2O$.
Color and properties: Yellowish, crystalline powder; very deliquescent.
Constants: Sp.gr. 4.636; m.p. 27°C.
Soluble in water and alcohol.
Derivation: By the action of bromine on iron filings.
Method of purification: Crystallization.
Containers: Glass bottles.
Uses: Medicine (alterative tonic, styptic, unofficial).
Railroad shipping regulations: None.*

Ferrous Carbonate (Iron carbonate; Iron protocarbonate) (a) $FeCO_3$; (b) $FeCO_3.H_2O$.
Color and properties: Greenish-brown crystals.
Constants: Sp.gr. 3.70 to 3.87; m.p. 470°C.; b.p. Decomposes at 880°C.
Soluble in acids; insoluble in water.
Derivation: (a) Found as such in nature (siderite). (b) By precipitation of a solution of a ferrous salt with sodium carbonate, yielding a slightly hydrolyzed salt.
Grades: Technical.
Containers: Wooden barrels.
Uses: Iron salts.
Railroad shipping regulations: None.*

Ferrous Chloride (Iron chloride; Iron dichloride; Iron protochloride; Ferrous protochloride)
(a) $FeCl_2$; (b) $FeCl_2.4H_2O$.
Color and properties: Greenish-white crystals.
Constants: Sp.gr. (a) 2.988; (b) 1.93.
Soluble in alcohol and water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the action of hydrochloric acid on an excess of iron, with subsequent crystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 100 lb. kegs; 200 lb. barrels; 500 lb. drums.
Uses: Mordant in dyeing; metallurgy; pharmaceutical preparations; starting point in manufacture of ferric chloride.
Railroad shipping regulations: None.*

Ferrous Fluoride (Iron fluoride) $FeF_2.8H_2O$.
Color and properties: White powder.
Constants: Sp.gr. 4.09.
Soluble in acids; slightly soluble in water; insoluble in alcohol and ether.
Derivation: By the action of fluorine on iron filings.
Grades: Technical.
Containers: Boxes.
Uses: Ceramics; manufacturing alkaline fluorides.
Railroad shipping regulations: None.*

Ferrous Iodide (Iron iodide; Iron protoiodide; Ferrous iodide; Ferrous protoiodide) $FeI_2.4H_2O$.
Color and properties: Crystalline, grayish-black masses.
Constants: Sp.gr. 2.873; m.p. 177°C.
Soluble in water and alcohol.
Derivation: By the action of iodine on iron filings.
Grades: Technical; U.S.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Manufacture of alkali metal iodides; pharmaceutical preparations.
Railroad shipping regulations: None.*

Ferrous Lactate $Fe(C_3H_5O_3)_2.3H_2O$.
Color and properties: Greenish-white crystals or powder.
Moderately soluble in water.
Derivation: By interaction of calcium lactate with ferrous sulfate or direct action of lactic acid on iron filings.
Grades: N.F.
Containers: 1 lb. bottles.
Uses: • Medicine (chlorosis).

Ferrous Oxalate (Iron oxalate) $FeC_2O_4.2H_2O$.
Color and properties: Pale yellow, odorless, crystalline powder.
Soluble in acids; insoluble in water.
Derivation: By the interaction of solutions of ferrous sulfate and sodium oxalate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs; boxes.
Uses: Medicine; photographic developer.
Railroad shipping regulations: None.*

Ferrous Protoiodide. See Ferrous iodide.

Ferrous Protochloride. See Ferrous chloride.

Ferrous Protoiodide. See Ferrous iodide.

Ferrous Protosulfide. See Ferrous sulfide.

Ferrous-quinine Citrate (Iron-quinine citrate).
Color and properties: Greenish-yellow, thin scales; somewhat deliquescent in air.
Slightly soluble in water.
Derivation: By adding quinine to a solution of ferric citrate.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ferrous Sulfate (Iron sulfate; Iron vitriol; Green copperas; Copperas; Green vitriol; Sal chalybis) $FeSO_4.7H_2O$.
Color and properties: Greenish crystals, often brownish-yellow in color from oxidation and efflorescence.
Constants: Sp.gr. 1.8987; m.p. 64°C.
Soluble in water; insoluble in alcohol.
Derivation: (a) A by-product from the pickling of steel and in many chemical operations. (b) By the action of dilute sulfuric acid on iron. (c) Oxidation of pyrites in air, followed by leaching and treatment with scrap iron.
Method of purification: Recrystallization.
Grades: Technical; sugar sulfate (anhydrous); C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 25 lb. boxes; 100 lb. kegs; 200 lb. bags; 400-425 lb. barrels.
Uses: Water purification; writing inks; pigments; medicine (active local irritant and astringent); Prussian blue; textile industry; leather industry; photography; iron salts; deodorizer; disinfectant; reagent in analytical chemistry; weed exterminator; indigo dyes; fertilizers; illuminating-gas purification; wood-preservative compositions; metallurgy (electrolytic iron; precipitating gold from its solutions; etching aluminum); process engraving and lithography.
Railroad shipping regulations: None.*

Ferrous Sulfate, Exsiccated (Dried ferrous sulfate).
Ferrous sulfate deprived of about six of its seven molecules of water of crystallization. Grayish-white powder, slowly soluble in water.
Used in medicine instead of the regular sulfate in making pills (U.S.P.).

Ferrous Sulfide (Iron sulfide; Iron protosulfide; Iron sulfuret; Ferrous protosulfide; Iron monosulfide) FeS.
Color and properties: Dark-brown or black metallic pieces, sticks or granules.
Constants: Sp.gr. 4.75 to 5.40; m.p. 1,179°C.
Soluble in acids; insoluble in water.
Derivation: By fusing iron and sulfur.
Impurities: Arsenic.
Grades: Technical.
Containers: 100 lb. boxes; 500 lb. kegs; 900 lb. barrels.
Uses: The manufactured sulfide is used for generating hydrogen sulfide; the natural pyrites is used in the manufacture of sulfuric acid, liquid sulfur dioxide and in the sulfite process for making wood pulp.
Railroad shipping regulations: None.*
See also Pyrite.

Ferrovanadium.
An alloy composed, principally, of iron and vanadium.

Approximate analysis:	Per Cent
Vanadium	33 to 42
Silicon	3 to 5
Carbon	0.5 to 3

Form available: Crushed or in lumps up to 10 lbs.
Melting-point: 2,280° to 2,550°F.
Uses: Vanadium increases the ultimate strength and yield point of steel when subjected to heat treatment. It also increases the resistance of the steel to impact and prolongs its life when subject to constant vibration or reversed stresses. It is sometimes used alone in carbon steel or in combination with other alloys. The amount added in structural steel is generally 0.15 to 0.25%. In high speed steel, the proportion ranges between 0.90 and 2%.
See also Vanadium steels under Iron and steel (Ferrum).

Ferrozirconium Alloys. See Zirconium ferro alloys.

Ferrum. See Iron and Steel.

Ferrum Reductum (Reduced iron).
Color and properties: Gray, amorphous, fine granular powder.
Derivation: By reducing ferric oxide, heated to a dull redness, in a stream of dry hydrogen.
Grades: Technical; U.S.P.
Containers: 1 lb. bottles; 1, 5, 25, 50 lb. cans.
Uses: Medicine; organic synthesis.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Fibrin, Muscle. See Syntonin.

Fibrolite. See Sillimanite.

Fucus. See Fig.

Field Horsetail. See Equisetum.

Fig (Ficus).
Derivation: The partially dried fruit of Ficus carica.
Habitat: Western Asia; cultivated in subtropics, Italy, France and California.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (laxative); food; confectionery.
Railroad shipping regulations: None.*

Fig-tree Wax (Gondang wax; Kondang wax; Getah wax; Java wax; Sumatra wax).
Color and properties: Hard, brown lumps, cream-colored inside.
Constants: Sp.gr. (after melting and cooling) 1.015 at 15°C.; softening point 55°C.; m.p. 73°C.
Soluble in chloroform, carbon bisulfide, benzene, light petroleum, oil of turpentine, boiling ether.
Derivation: Obtained from the milky juice exuding from incisions in the wild fig tree (Ficus variegata).
Grades: Technical.
Railroad shipping regulations: None.*

Filt-Char. Proprietary name of a brand of bone charcoal used as a filtering, decolorizing and deodorizing medium.

"Filter-Cell." Proprietary name of a brand of infusorial earth used as a filtering medium.

Filtros.
Trade name for a white rigid uniformly porous acid-proof mineral substance composed essentially of silica which, for purposes of most general description, may be termed an artificial stone.
Derivation: By mixing carefully graded silica sand (SiO_2) of high purity with a synthetic silicate bond, subsequently pressed to shape and kiln-fired at temperatures in excess of 2,200°F.
Grades: Produced in different grades of porosity.
Containers: Cartons or wooden crates, depending upon size and shape.
Uses: As a filtering, aerating or diffusing medium.
Railroad shipping regulations: None.*

Finish Remover. See Paint remover.

Fiorite. See under Opal, Siliceous sinter.

Fir, Balsam. See Canada balsam.

Fir Oil, Douglas. See Pine-needle oils.

Fire-clay. See under Clays, Fire-clay.

Fire Opal. See Opal.

Fire-proofing Brick Clay. See under Clays.

Firearmor. A ferrous alloy containing 60% nickel, 20% chromium, 10% iron, 1.75% manganese, 0.5% carbon.

"Firefrax." A registered proprietary name for a fire-clay cement.
Physical characteristics: White; high alumina content with hard burned, high Al_2O_3 grog; weight per cu. ft. 115 lbs.; pyrometric cone equivalent cone 30; application range, plastic type from cold to 3,000°F.; dry type, from 2,200° to 2,800°F.; refractory product.
Derivation: A calcined fire-clay base, bonded with refractory clays.
Grades: Wet or plastic type; dry or powder form. Fineness, about 30 mesh and finer.
Containers: Wet type, drums; barrels. Dry type, drums; kegs; bags.
Railroad shipping regulations: None.*

Firwood Oil. See Pine-needle oils.

Fischer's Reagent. A reagent used as a test for sugars.
Preparation: 3 parts of sodium acetate and 2 parts of phenylhydrazine hydrochloride in 20 parts of water.

Fisetin $C_{15}H_{10}O_6$.
Color and properties: Yellow needles. The coloring principle of young fustic (q.v.).
Constants: M.p. 360°C.
Soluble in alcohol and alkaline solutions.
Derivation: By extraction from young fustic.

Fish Berry. See Cocculus.

Fish Oil. See Black-fish, Cod-liver, Halibut, Herring, Menhaden, Porpoise, Salmon, Sardine, Shark and Tuna oils.

Fish Scrap, Acidulated. See Fish scrap, wet.

Fish Scrap, Dry.
Fish carcasses which have been steam-cooked, the oil and water expressed, and the residue dried. Contains 8 to 12% ammonia and 4 to 8% phosphoric acid.
Uses: Fertilizer.
Railroad shipping regulations: Must have more than 8% moisture.

Fish Scrap, Wet (Fish scrap, acidulated; Wet acid scrap).
See Fish scrap, dry. The carcasses in this process are not dried after pressing but are acidulated with sulfuric acid. Good acid scrap that has not lain long in piles will analyze, on 50% water basis, as high as 7.50 to 7.75% ammonia. After air drying it will analyze 10% water, 10.50 to 11.50% ammonia. Used as a fertilizer.
Railroad shipping regulations: None.*

Fixed Nitrogen. See Nitrogen fixation.

Fixing Agents, Chemical.
(a) Substances which are instrumental in the fixation of various mordants upon textile material by uniting chemically with them and holding them upon the fiber until the dyes may have an opportunity to unite with them.
(b) Substances which cause the actual precipitation of the mordant on the fiber by double decomposition.

Fixing Agents, Mechanical.
(a) Substances (e.g., albumin) which are capable of holding pigments permanently upon textile fibers.
(b) Certain gums and starches which are capable of holding dyes and other substances upon textile fibers for a sufficient length of time to permit some desirable reaction taking place.

Fixol. A trade name for hydroxycitronellal of high boiling point (275°C.).

Flag, Sweet. See Calamus.

Flagstone. A rock which may be cleft into large slabs suitable for sidewalks. See Bluestone. Alabama, Connecticut, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia and Wyoming.

Flake Lead. See Lead carbonate, basic.

Flake White. See White, Cremnitz.

Flavanthrene (Indanthrene yellow; Chloranthrene yellow) $C_{28}H_{12}O_2N_2$.
A vat dye.
Color and properties: Brownish-yellow needles.
Soluble in dilute alkaline solutions.
Derivation: By the action of antimony pentachloride on beta-aminoanthraquinone in boiling nitrobenzene.
Uses: Dyeing.
Railroad shipping regulations: None.*

Flax-seed. See Linseed.

Flax-seed Oil. See Linseed oil.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Fleabane. See Erigeron.

Fleabane Oil. See Erigeron oil.

Flea-seed. See Psyllium.

Flea-wort. See Psyllium.

Flint.

A form of native silica or quartz (q.v.) which may grade into chalcedony (q.v.), chert (q.v.), hornstone (q.v.), or jasper (q.v.). Contains 98% silica, 1 to 1.4% water, with traces of iron, aluminum, calcium and organic matter. Color, dull yellowish, blackish, brownish, smoky gray or a mixture of all four; white crust; waxy, greasy luster. Is more easily soluble in hot caustic alkali than crystallized quartz. The term is rather loosely used in the United States for a dense fine-grained form of silica which is very tough and breaks with a conchoidal fracture and cutting edges but true flints are not found in the Western Hemisphere.

Constants: Sp.gr. 2.60 to 2.63.

Occurrence: England, France, Denmark, Ireland.

Uses: In the manufacture of porcelain, pottery, enamelware; building stone; road metal; concrete; flint glass; refractory bricks; balls for ball mills; chemical tower packing; agate mortars; polishers and burnishers; sand paper.

Floatstone. See Opal.

Floor Oils. Oils used to impart a good polish and prevent dust from arising. Non-viscous, neutral oils having similar properties to concrete-form oil (q.v.) are suitable for this purpose.

Floramid. A proprietary brand of urea developed for used as a high-concentration fertilizer.

Railroad shipping regulations: None.*

Florence Oil. A term sometimes applied to olive oil imported from Leghorn.

Flores Martis. See Ferric chloride.

Florspar. See Fluorspar.

Flos-ferri. See Aragonite.

Flower of Paradise. See Henna.

Flowers of Sulfur. See Sulfur.

Flowers of Tin. See Stannic anhydride.

Flowers of Zinc. See Zinc oxide.

Flowery Head Spurge. See Euphorbia pilulifera.

Flu-id-Cres. Trade name for a coal-tar disinfectant.

Flu-id-dite. Trade name for a soluble cleaner.

Flu-id-Doil. Trade name for a paraffin floor oil.

Flu-id-Pine. Trade name for a pine-oil disinfectant.

Flu-id-zip. Trade name for a liquid scrub soap.

Fluidextracts, U.S.P. Concentrated liquid preparations of vegetable drugs, containing alcohol either as a solvent or as a preservative, and bearing a uniform relation to the drugs used so that 1 cc. of the fluid extract closely represents the useful constituents of 1 gm. of the air-dried and powdered drug of standard quality. The following fluidextracts are official in the Tenth Decennial Revision of the United States Pharmacopoeia: Belladonnae foliorum (belladonna leaves), Belladonnae radicis (root), Buchu, Cannabis, Cascarae sagradae, Cascarae sagradae aromaticum, Cimicifugae, Cinchonae, Colchici, Ergotae, Eriodictyi, Eucalypti, Glycyrrhizae (licorice root), Granati (pomegranate), Hydrastis, Hyoscyami, Ipecacuanhae, Rhei (rhubarb), Rhois glabrae (rhus glabra), Rose, Sarsaparillae, Scillae (squill), Senegae, Sennae, Uvae ursi, Zingiberis (ginger).

Fluorapatite. See Apatite.

Fluorapetite. See Apatite.

Fluorene (Alpha-diphenylenemethane) $C_6H_4C_6H_4CH_2$.

Color and properties: Small, white, crystalline plates; fluorescent when impure.

Constants: M.p. 116°C.; b.p. 295°C.

Soluble in alcohol, ether, benzene and carbon bisulfide; insoluble in water.

Derivation: By reduction of diphenylene ketone with zinc.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs.

Uses: Organic synthesis.

Railroad shipping regulations: None.*

Fluorescein (Resorcinolphthalein; Diresorcinolphthalein; Tetraoxyphthalophenonanhydride) $O(C_6H_3OH)_2CC_6H_4COO.H_2O$.

Color and properties: Orange-red, crystalline powder; very dilute alkaline solutions exhibit a very intense, greenish-yellow fluorescence by reflected light, while the solution is reddish-orange by transmitted light.

Constants: M.p.: Decomposes at 290°C.

Soluble in dilute alkalis, boiling alcohol, ether and dilute acids.

Derivation: By heating phthalic anhydride and resorcinol.

Grades: The sodium salt (uranine) and potassium salt are marketed.

Containers: Wooden kegs.

Uses: Preparation of dyestuffs; dyeing.

Railroad shipping regulations: None.*

Fluorescein-sodium. See Uranine.

Fluorescin. A reduction product of fluorescein, used as a diagnostic agent in ophthalmology.

Fluorhydric Acid. See Hydrofluoric acid.

Fluorine F_2.

Color and properties: Colorless gas; corrosive; poisonous!

Constants: Sp.gr. 1.14 (Air=1); m.p. −223°C.; b.p. −187°C.

Insoluble in water.

Derivation: By electrical decomposition of anhydrous hydrofluoric acid at −23°C.

Containers: Made where and as used, as no practical container has been devised.

Uses: Organic synthesis; fluorine compounds.

Railroad shipping regulations: Never shipped. Not commercial article.

Fluorite. See Fluorspar.

Fluorol. See Sodium fluoride.

Fluorspar (Fluorite; Florspar) CaF_2.

A natural calcium fluoride found in cavities in granite rocks, veins of tin ores, sandstone and most abundantly as an associate of lead ore in veins traversing limestone. Color, white, yellow, green, violet, blue, brown or black; vitreous luster; white streak.

Constants: Sp.gr. 3.01 to 3.25; hardness 4; m.p. 1,650°F.

Grades: Lump: No. 1 acid, less than 2.0% calcium carbonate and silica, minimum 98.0% CaF; No. 1 fluxing, less than 3.0% silica, minimum 95.0% CaF; No. 2 fluxing, less than 6.0% silica, minimum 85.0% CaF. Ground: No. 1 acid, less than 2.0% calcium carbonate and silica, minimum 98.0% CaF; No. 2, less than 3.0% silica and free of lead, zinc, or iron, minimum 95.0% CaF. Gravel: Less than 6.0% silica, minimum 85.0% CaF.

Occurrence: United States (Colorado, Illinois, Kentucky, New Mexico), England, Germany, South Africa, France, Italy, Belgium, China, Czecho-Slovakia, Canada.

Containers: Open top cars; paper-lined box cars; 125 lb. bags; 450 lb. barrels.

Uses: Metallurgy (over 80% of domestic consumption is in open-hearth steel furnaces. Also used in metallurgy or antimony, lead, aluminum, ferrosilicon, ferromanganese, copper, gold, silver); manufacture of opalescent glass and sanitary and enamel ware; chemicals (hydrofluoric acid, fluorine and fluorides, potash extraction,

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

calcium cyanamide); lessening consumption of fuel in cement kilns; glass etching; binder in abrasives; manufacture of carbon electrodes, wood preservatives.
Railroad shipping regulations: None.*

Flux.
In ordinary parlance the term is interpreted as meaning to melt, or make fluid, or flow continuously, or in a state of transition. In technology it is interpreted as follows:
Chemistry and metallurgy: A substance that promotes the fusing of minerals or metals or prevents the formation of oxides. For example, in metal refining an addition of some mineral to the furnace charge is made for the purpose of absorbing mineral impurities in the metal. A slag (q.v.) is formed which floats on the top of the bath and is run off.
Soldering and brazing: A substance which is applied to the portions to be united and which, on the application of heat, aids in the ready flowing of the solder and prevents the formation of oxides while the solder unites with the two parts to form a tight joint.
Ceramics: Any readily fusible glass or enamel used as a base or ground.
Medicine: An abnormal flow or a morbid discharge of a fluid of the body.
Physics: The rate of flow or transfer of electricity, water, heat, energy, etc., the term being used to denote the quantity that crosses a unit area of a given surface in a unit of time.
Mathematics: A vector referred to a unit of surface.

Flux, Black.
Derivation: Potassium carbonate or sodium carbonate; sodium nitrate and carbon.
Containers: Tin cans.
Uses: Assaying.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Flux Oil.
Constants: Various gravities, but those of 11° to 14°Bé. are usually used.
Derivation: From asphalt-base petroleum.
Uses: Used by roofing and paving contractors to flux natural asphalts.
Railroad shipping regulations: None.*
See also Residual oils.

Flux, White.
Sodium carbonate, sodium nitrate and sodium nitrite.
Color and properties: White powder; strong oxidizer.
Containers: Tin cans.
Uses: Metallurgy; welding.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Flystone. Powdered cobalt ore, mixed with sweetened water. It is used for poisoning flies.

Foeniculum. See Fennel.

Foenum Graecum. See Fenugreek.

Fool's Gold. See Iron pyrites.

Formal. See Methylal.

Formaldehyde (Oxymethylene; Formalin; Formalith; Formic aldehyde; Formol) HCOH.
Color and properties: Clear, colorless liquid; suffocating pungent odor; poisonous! An aqueous solution of formaldehyde gas.
Constants: Sp.gr. 1.075 to 1.081; b.p. (gas) —21°C.
Miscible with water and alcohol.
Derivation: By passing the vapors of methanol through a heated copper or platinum gauze and subsequent absorption in water.
Grades: C.P.; U.S.P.; usually sold on the basis of the U.S.P. specification of a minimum of 37% absolute CH_2O by weight, 40% by volume. Actually the content varies from 40 to 42% by volume.
Containers: 1, 5 lb. bottles; 8 lb. jugs; 16, 24, 40 lb. demijohns; 50, 100 lb. carboys; 125 lb. kegs; 400-450 lb. barrels.
Uses: Chemicals (formic acid, formals from alcohol, urea, hydrosulfite derivatives, hexamethylenetetramine, acetaldehyde, paraformaldehyde); dyes (triphenylmethane dyes, auramine dyes, anthracene dyes, quinoline dyes, acridine); explosives; medicine (disinfectant, germicide); embalming fluids; pharmaceuticals (deodorizing and rendering tasteless products from sulfonated mineral oils, making therapeutic preparations from wood tar distillation oils, applications for wounds, insect stings, etc., various preparations); insecticide; food (preserving milk, treatment of frozen meat on ships, curing foods); photography; plastics (phenol condensation products of various properties, condensation of cresol and other organic substances, bonelike articles from galalith, condensation agent in making cyclohexanone resins, securing insolubility and stability in casein preparations); brewing; distilled liquors; inks; leather (giving body to the surface of leather in tanning, preserving and stiffening the grain of hides); waterproofing straw hats; fixing hair on fur skins; preservative for botanical, zoological and bacteriological purposes; waterproofing paper by fixing gelatin or glue impregnated therein; disinfectant soaps; hardening and preservative agent in treatment of starches and starch preparations; preserving sugar cane syrups and juices; rayon; textile processes; silvering mirrors; metallurgy (reducing agent in recovery of gold and silver); rubber (preservative, coagulant).
Railroad shipping regulations: None.*

Formaldehydeacetamide. See Formicin.

Formaldehyde-gelatin. Glutol (q.v.).

Formaldehyde, Meta-. See Trioxymethylene.

Formaldehyde, Para-. See Paraformaldehyde.

Formaldehyde, Polymerized. See Paraformaldehyde.

Formalin. See Formaldehyde.

Formalith. See Formaldehyde.

Formamidated Chloral. See Chloral formamide.

Formamide (Methanamine)
$HCONH_2$.
Color and properties: Clear, colorless, oily liquid.
Constants: Sp.gr. 1.146; b.p. 200° to 212°C., with partial decomposition.
Soluble in water and alcohol.
Derivation: By the interaction of ethyl formate and ammonia, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Formamylum. See Amyloform.

Forman (Chloromethylmenthyl ester)
C_6H_5NHCHO.
Color and properties: Colorless, oily liquid; fumes slightly in the air.
Soluble in alcohol.
Derivation: By the interaction of formaldehyde and menthol in presence of hydrochloric acid gas, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Formanilide (Phenylformamide)
C_6H_5NHCHO.
Color and properties: Colorless to yellowish crystals.
Constants: M.p. 46°C.
Soluble in alcohol and water.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the reaction of aniline and formic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Formasal. See Methylene disalicylic acid.

Formic Acid (Acid hydrogen carboxylic) $HCOOH$.
Color and properties: Colorless liquid; pungent odor; dangerously caustic.
Constants: Sp.gr. 1.2178; m.p. 8.3°C.; b.p. 100.8°C.
Soluble in water, alcohol and ether.
Derivation: By treatment of sodium formate and sodium acid formate with sulfuric acid at low temperatures, and distilling in vacuo.
Method of purification: Rectification.
Grades Technical; 85%; 90%; N.F. 75%; C.P.
Containers: 150, 195 lb. carboys.
Uses: Chemical (formates, organic esters, oxalic acid, allyl alcohol); dyeing and finishing of textiles; electroplating; use also suggested in tanning and in wine manufacture to aid fermentation; medicine (local irritant and vesicant); brewing (antiseptic); food preservative; silvering glass; leather; cellulose formate; rubber coagulant.
Railroad shipping regulations: White label.

Formic Aldehyde. See Formaldehyde.

Formic Ether. See Ethyl formate.

Formicin (Formaldehydeacetamide) $CH_3CONHCH_2OH$.
Color and properties: Colorless, syrupy liquid.
Constants: Sp.gr. 1.25.
Soluble in water, alcohol and chloroform.
Derivation: By the interaction of acetamide and formaldehyde, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Disinfectant.
Railroad shipping regulations: None.*

Formin. See Hexamethylenetetramine.

Formol. See Formaldehyde.

Formonitrile. See Hydrocyanic acid.

Formopyrine (Methylenediantipyrine) $(C_{11}H_{11}N_2O)_2CH_2$.
Color and properties: Colorless crystals.
Constants: M.p. 176° to 177°C.
Soluble in alcohol; insoluble in water.
Derivation: By the interaction of formaldehyde and antipyrine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Antiseptic.
Railroad shipping regulations: None.*

Formosa Camphor. See Camphor.

Formyl Tribromide. See Bromoform.

Formyl Trichloride. See Chloroform.

Formyl Triïodide. See Iodoform.

Forsterite. See Olivine.

Fortex. An ammonium nitrate-tetryl (q.v.) explosive.

Fortoin $CH_2(C_{14}H_{11}O_4)_2$.
Color and properties: Yellow needles or powder, faint cinnamon odor.
Constants: M.p. 211° to 213°C.
Soluble in chloroform, acetone, dilute alkalis, glacial acetic acid; sparingly soluble in alcohol and ether; insoluble in water.
Derivation: Interaction of formaldehyde and cotoin.
Uses: Medicine (chronic intestinal catarrh when there is no active inflammation, ulcerated sore throats, gonorrhea, unofficial).
Railroad shipping regulations: None.*

Fossil Flour. See Diatomaceous earth.

Fossil Resin. See Amber.

Fossil Wax. See Ozokerite.

Fousel Oil. Fusel oil (q.v.).

Fowler's Solution. A solution of potassium arsenite of definite strength, made by boiling arsenic trioxide with potassium bicarbonate solution. Used in medicine as a means of administering arsenic in soluble form.

Foxglove. See Digitalis.

Foxglove Blue. See Iron blues.

Foxglove Oil. An olive oil in which the fresh leaves of the foxglove have been digested.

Franciscea. See Manaca.

Frangula (Buckthorn; Alder buckthorn; Black dogwood; Berry alder; Arrow wood; Persian berries).
Dried bark of Rhamnus frangula; collected at least one year or heated at 37.7°C. for 48 hours before use to destroy ferment present in green bark.
Habitat: Europe, Siberia and Mediterranean coast of Africa.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (similar to rhubarb).
Railroad shipping regulations: None.*

Frankfort Black. See under Blacks, Vegetable black.

Frankincense. See Thus gum.

Frankincense Oil. See Olibanum oil.

Franklinite $(FeMnZn)(FeMn)_2O_4$.
Black mineral resembling magnetite (q.v.). Luster, metallic or dull. Only slightly magnetic. Frequently associated with red zincite and yellow to green willemite. Slowly soluble in hydrochloric acid.
Constants: Sp.gr. 5 to 5.2; hardness 6 to 6.5.
Occurrence: United States (New Jersey).
Uses: Zinc is recovered as zinc white and the residue is smelted for spiegeleisen. Also has been ground for dark paints.

Fraude's Reagent. See Perchloric acid.

Fraxinus Excelsior (European ash).
Derivation: Bark and herb of Fraxinus excelsior.
Chief constituents: Paviïn, tannin.
Habitat: Europe.
Grades: Technical.
Containers: Bags.
Uses: Dyeing; medicine.
Railroad shipping regulations: None.*

Fredricite. Similar mineral to tennantite (q.v.) but contains also some iron, lead, silver and tin. Found in Sweden.

Freezing-machinery Oils. See Ice-machine oils.

Freibergite. A variety of fahlore (q.v.) containing from 3 to 30% silver. Usually steel-gray, lighter in color than the ordinary varieties, but sometimes iron black. Streak reddish.
Constants: Sp.gr. 4.85 to 5.0.
Occurrence: United States (Idaho, Nevada).

Freieslebenite $(Pb,Ag_2)_5Sb_4S_{11}$ or $5(Pb,Ag_2)S.2Sb_2S_3$.
A natural lead-silver sulfantimonide. Color and streak, light steel-gray inclining to silver-white, or to blackish lead-gray.
Occurrence: United States (Colorado), Germany, Hungary, Spain.

French Chalk. See Talc.

French Glue. See Glue and gelatin.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

French Polish. Shellac dissolved in alcohol and colored with dragon's blood.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

French Saffron. See Crocus.

Freund's Acid. See 1-Naphthylamine-3:6-disulfonic acid.

Friar's Cowl. See Aconite.

Frit.
A term used in the ceramic industry and applied to a semi-fused mass, the constituents of which originally were soluble, or insoluble, fusible or infusible. By "fritting" (i.e., preliminary fusing) the original properties of the constituents are changed; thus, the soluble materials become insoluble and the infusible materials fusible. Accordingly, substances which could not otherwise be used in a glaze batch, but which are absolutely necessary for the best results, can be used. Other advantages offered by fritting are minimizing danger to health of workers when using lead salts, inducing better suspension of heavy products in the batch, more even distribution of constituents of the batch; ability to fire the glazed ware at a lower temperature. Most of the glazes used on dinnerware and sanitary ware contain frit. See also Glazes.

Fritzsche's Reagent. Dinitroanthraquinone.

Frohde's Reagent. A reagent used as a test for alkaloids, prepared by dissolving 0.5 gram sodium molybdate in 100 cc. concentrated sulfuric acid.

Fructose (Fruit sugar; Levulose)
$C_6H_{12}O_6$.
Color and properties: Yellowish, white crystals.
Constants: Sp.gr. 1.555; m.p. 95°C.
Soluble in water, alcohol and ether.
Derivation: (a) Found together with glucose in sweet fruits and in large quantities in honey. (b) By the hydrolysis of inulin.
Grades: Technical.
Containers: Wooden barrels; tins.
Uses: Foodstuffs; medicine.
Railroad shipping regulations: None.*

Fruit Sugar. See Fructose.

Fuchsine (Magenta; Rosein; Harmaline; Aniline red). A synthetic, rosaniline dyestuff, a mixture of rosaniline and pararosaniline.
Grades: Based on the strength.
Containers: Wooden kegs; tin boxes.
Uses: Textile and leather industries, as a red dye.
Railroad shipping regulations: None.*

Fucus (Bladderwrack).
Dried thallus of the common brown algae, Fucus vesiculosus, F. siliquosus, F. nodosus or F. serratus.
Habitat: Rocks in north Atlantic ocean.
Grades: N.F.
Uses: Medicine (obesity).

Fuel Oil. An indefinite term employed broadly to describe any petroleum product used for the production of heat or power, ranging from the distillate series down to and including any product which can be made liquid by steam heat and for which no better market outlet can be obtained. There are no fixed specifications for industrial fuel oils. The following are the properties called for by the United States Government Master Specifications for Lubricants and Liquid Fuels.

Diesel Engine Oil. See Fuel oil (Navy standard).

Fuel Oil (Navy Standard).
Grade used by United States Government where a high-grade fuel oil is required. This oil may be used in Diesel engines. Shall be a hydrocarbon oil, free from grit, acid, and fibrous or other foreign matters likely to clog or injure the burners or valves. If required by the purchaser, the oil shall be strained by being drawn through 2 or more filters of wire gauze of 16 meshes to the inch. Clearance through the strainer shall be at least twice the area of the suction pipe and the strainers shall be in series.
Physical characteristics: Flash point not lower than 150°F. (Pensky-Martens closed tester). [Where oils have a viscosity greater than 30 seconds at 150°F. (Saybolt) the flash point shall not be below the temperature at which the oil has a viscosity of 30 seconds]; viscosity not greater than 100 seconds at 77°F. (Saybolt Furol viscosimeter); sulfur not over 1.5%; water and sediment not more than 1.0% (combined).

Bunker Fuel Oil "A." A low-viscosity oil.
Physical characteristics: Flash point not lower than 150°F. (Pensky-Martens closed tester); [Where oils have a viscosity greater than 30 seconds at 150°F. (Saybolt) the flash point shall not be below the temperature at which the oil has a viscosity of 30 seconds]; viscosity not greater than 100 seconds at 77°F. (Saybolt Furol viscosimeter); water and sediment not more than 1.0% (combined).

Bunker Fuel Oil "B." A more viscous oil than "A."
Physical characteristics: Flash point not lower than 150°F. (Pensky-Martens closed tester); viscosity not greater than 100 seconds at 122°F. (Saybolt Furol viscosimeter); water and sediment not more than 1.0% (combined).

Bunker Fuel Oil "C." A more viscous oil than "B." Because of its high viscosity it can be used in Diesel engines adapted to highly viscous oils.
Physical characteristics: Flash point not lower than 150°F. (Pensky-Martens closed tester); viscosity not greater than 300 seconds at 122°F. (Saybolt Furol viscosimeter); water and sediment, sediment not to exceed 0.25%. Total water plus sediment not to exceed 2.00%. A deduction in quantity is made for all water plus sediment in excess of 1.0%.
Railroad shipping regulations: None.*

Fuller's Earth.
Derivation: An imperfectly understood clay relatively high in magnesia. It may or may not be plastic. Arkansas, Colorado, Florida, Georgia, Massachusetts, South Carolina, South Dakota and Texas.
Grades: Technical.
Containers: 80, 100, 200, 230 lb. bags.
Uses: Decolorizing agent; filtering medium; cosmetic powders; rubber filler; textiles (bleaching and cleansing cloth, scouring yarns and washing woolens); pigments.
Railroad shipping regulations: None.*

Fumaric Acid (Lichenic acid)
$HC(COOH)_2CH$.
Color and properties: Small prisms.
Constants: Sp.gr. 1.625; m.p. 286° to 287°C.; sublimes at 200°C. without decomposition.
Derivation: (a) By heating halogen-substituted succinic acids. (b) By reduction of tartaric acid. (c) By condensing malonic acid with glyoxylic acid in presence of pyridine. (d) Found in various plants; also in fresh beef.
Railroad shipping regulations: None.*

Furac II (Zinc dithiofuroate) $(C_4H_3OCSS)_2Zn$.
Color and properties: Yellow-red solid. This salt is faster in action than its lead analog.
Derivation: By treatment of dithiofuroic acid with zinc acetate.
Grades: Technical.
Containers: 100, 250 lb. drums.
Railroad shipping regulations: None.*

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Furac III (Lead dithiofuroate) $(C_4H_3OCSS)_2Pb$.

Color and properties: Red solid.

Derivation: By treatment of dithiofuroic acid with lead acetate.

Grades: Technical.

Containers: 100, 250 lb. drums.

Uses: "Ultra" accelerator in the vulcanization of rubber.

Railroad shipping regulations: None.*

Furacrolein $C_4H_3OCHCHCHO$.

Color and properties: Light yellow crystalline solid when freshly prepared. Turns dark reddish-brown even when stored in a dark, airtight container. Pungent odor.

Insoluble in water; soluble in alcohol and ether.

Constants: M.p. 51°C.; b.p. over 200°C. with decomposition.

Grades: Technical.

Containers: Bottles.

Railroad shipping regulations: None.*

Furacrylic Acid (Furfural acetic acid; Furylacrylic acid) C_4H_3O CHCHCOOH.

Color and properties: Cream-colored powder.

Moderately soluble in water.

Constants: M.p. 141°C.; b.p. 255° to 265°C., with decomposition.

Derivation: From furfural by Perkins condensation.

Grades: Technical.

Containers: Bottles.

Uses: The alkyl esters of this acid possess considerable value as components of perfumes.

Railroad shipping regulations: None.*

Furan C_4H_4O.

Color and properties: Colorless liquid turning brown on standing. This color change is retarded if a small amount of water is with the furan.

Insoluble in water; soluble in alcohol and ether.

Constants: Sp.gr. 0.937 (20°/20°); b.p. 31°C.

Derivation: Dry distillation of furoic acid.

Grades: Technical.

Containers: Cans.

Railroad shipping regulations: None.*

This material is somewhat toxic and in a room its fumes should not be allowed to reach a very high concentration.

Furfural (Furfurol; Furfuraldehyde; Furol; Furfuranecarboxylic aldehyde; Pyromucic aldehyde) C_4H_3OCHO.

Color and properties: Colorless, mobile liquid when very pure; changes to reddish brown upon exposure to light and air. Penetrating odor somewhat similar to benzaldehyde. Furfural forms condensation products with many types of compounds, phenol, amines, urea, etc.

Constants: M.p. —36.5°C.; b.p. 161.7°C.; sp.gr. 1.1598 (20°/4°); heat of vaporization 107.5 calories; flash point 55.57°C.; refractive index 1.5260.

Soluble in alcohol, ether and benzene; 8.3% soluble in water at 20°C.

Derivation: From oat hulls by steam-acid digestion.

Purification: Vacuum distillation.

Grades: Technical; refined.

Containers: 55 gal. steel drums; tank cars.

Uses: Synthetic resins; purification of organic materials by selective solvent action; nitrocellulose solvent; photoengraving processes; preservative; furoates and derivatives.

Fire hazard: Slight.*

Railroad shipping regulations: None.*

Furfural Acetic Acid. See Furacrylic acid.

Furfural Acetone $C_4H_3OCHCHCOCH_3$.

Color and properties: Light yellow crystals turning dark reddish-brown upon standing.

Soluble in alcohol, ether and chloroform. Insoluble in water.

Constants: M.p. 39° to 40°C.; b.p. 229°C. with decomposition.

Derivation: Condensation of furfural with acetone in alkali solution. Some difurfural acetone is always formed in this reaction.

Containers: Bottles.

Grades: Technical.

Railroad shipping regulations: None.*

Furfuraldehyde. See Furfural.

Furfuranecarboxylic Aldehyde. See Furfural.

Furfurol. See Furfural.

Furfuryl Acetate $C_4H_3OCH_2OOCCH_3$.

Color and properties: Colorless liquid turning brown upon exposure to light and air. Mild, pleasant odor.

Insoluble in water; soluble in alcohol and ether.

Constants: Sp.gr. 1.1175 (20°/4°); b.p. 175° to 177°C.

Derivation: By treatment of furfuryl alcohol with acetic anhydride.

Containers: Bottles.

Grades: Technical.

Railroad shipping regulations: None.*

Furfuryl Alcohol (Furyl carbinol) $C_4H_3OCH_2OH$.

Color and properties: Colorless, mobile liquid becoming brown to dark red upon exposure to light and air. Reacts with explosive violence with mineral acids (even when dilute) to form a black, brittle, insoluble, infusible resin.

Soluble in alcohol and ether. When freshly prepared or after standing over alkali it is soluble in water in all proportions but upon standing for some months or upon exposure to very slightly acid conditions it becomes more or less water-insoluble.

Constants: Sp.gr. 1.1351 (20°/20°); b.p. 169° to 170°C.; refractive index 1.4860.

Derivation: Catalytic hydrogenation of furfural. Cannizzaro reaction from furfural.

Grades: Technical; refined.

Containers: Bottles; 5, 10, 50 gal. drums.

Uses: Lacquer solvent; black resins for coloring lacquers and wood.

Railroad shipping regulations: None.*

Furoic Acid (Pyromucic acid) C_4H_3OCOOH.

Color and properties: Yellow-brown crystals subliming at 100°C. to white needles.

Constants: M.p. 132°C.; b.p. 230° to 232°C.

Soluble in alcohol and ether; 3.5% soluble in water at 15°C.

Derivation: Cannizzaro reaction from furfural: oxidation of furfural.

Purification: Sublimation; fractional crystallization from hot water.

Grades: Technical, 92 to 95% purity.

Containers: Cans; drums.

Uses: Preservative; furoates.

Railroad shipping regulations: None.*

Furoic Acid Esters C_4H_3OCOOR.

Color and properties: When pure, all colorless liquids, except ethyl furoate which is a white crystalline solid. Upon exposure to light and air these esters become yellow to brown in color. Mild, pleasant odors.

Soluble in alcohol and ether; very slightly soluble in water.

Constants: Methyl furoate, sp.gr. 1.1786; b.p. 181°C. Ethyl furoate, sp.gr. 1.1774; b.p. 197°C.; m.p. 34°C.. Propyl furoate, sp.gr. 1.0745; b.p. 211°C. Isopropyl furoate, sp.gr. 1.0655; b.p. 198°C. Butyl furoate, sp.gr. 1.0550; b.p. 223° to 236°C. Isobutyl furoate, sp.gr. 1.0383; b.p. 221° to 223°C. Amyl furoate, sp.gr. 1.0335; b.p. 232° to 234°C.

Derivation: By the usual esterification methods from furoic acid.

Grades: Technical.

Containers: Bottles; drums.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Have been suggested for use in certain types of industrial perfumes. All are solvents for nitrocellulose and dissolve a good many of the varnish gums. Their chief use has been in lacquers.
Railroad shipping regulations: None.*

Furol. See Furfural.

Furoyl Chloride C_4H_3 OCOCl.
Color and properties: Colorless liquid; powerful lachrymator. Must be handled with extreme care. Soluble in ether.
Constants: M.p. 0°C.; b.p. 170°C.
Derivation: Treatment of furoic acid with phosphorus pentachloride.
Uses: Substitute for chloropicrin in disinfecting grain elevators.
Railroad shipping regulations: None.*

Furyl Carbinol. See Furfuryl alcohol.

Fusel Oil (Fermentation amyl alcohol; Grain oil; Potato spirit; Potato oil). A volatile, poisonous, oily compound consisting largely of amyl alcohols. Isoamyl alcohol (isobutyl carbinol) and normal amyl alcohol (secondary butyl carbinol) are the chief constituents. Ethyl, propyl, butyl, hexyl and heptyl alcohols as well as the primary amyl alcohol have been separated. Acids, esters and aldehydes are also present.
Color and properties: Clear, colorless liquid, disagreeable odor.
Constants: Sp.gr. 0.814 (at 20°C.); weight 6.77 lbs. per gallon; boiling range of typical mixture below:

At or below	100°C.	None
At or below	110°C.	Not over 10%
At or below	120°C.	Not over 30%
At or below	130°C.	Not over 60%
Above	145°C.	None

Soluble in all proportions 60° gasoline without turbidity; soluble in water, alcohol and ether.
Derivation: Obtained as a by-product in the alcoholic fermentation of starch- or sugar-containing materials such as potatoes, grapes, beetroots, grain, etc.
Method of purification: Rectification.
Grades: Crude; refined.
Containers: 1, 5, 10 gal. cans; 5, 10, 53, 104 gal. drums; 6,000, 8,000 gal. tank cars.
Uses: Chemicals (amyl oxide, amyl acetate, pure amyl alcohol, nitrous ether, various esters); identification of alkaloids in analytical chemistry; explosives (gelatinizing agent); solvent for fats and oils; artificial fruit syrups; ice cream and soda water essences; intermediate; pharmaceuticals (preparation and purification of alkaloids, hypnotics, amyl nitrite); nitrocellulose plastics; synthetic rubber; varnishes, lacquers; solvent for resins and waxes; perfumery; photometry (combustible in the Hefner lamp).
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Fusible metals. Alloys which melt at comparatively low temperatures. For composition of various fusible metals see the table below.

Fusible Tea Spoons Alloy. See table under Fusible metals.

Fustic.
Old Fustic (Yellow wood; Yellow brazil wood). The wood of Chlorophora tinctoria of the family Moraceae.
Habitat: South America, West Indies, Central America.
Young Fustic (Cotinin). The wood of Rhus cotinus, the leaves being Venetian sumac.
Habitat: West Indies, southern Europe.
Grades: Ground wood or extract.
Uses: Natural yellow dyewoods usually used with chromium, tin or aluminum mordants.

CHEMICAL COMPOSITION OF FUSIBLE METALS †

	Bi	Sn	Pb	Cd	Other Elements	Temperature of Fusion
Anatomical Alloy	53.5	19.	17.	.....	Hg, 10.5	60°C.
Bismuth Solder	40.	20.	40.	.....	....	....
Bismuth Solder	33.3	33.3	33.3	.....	....	....
Bismuth Solder	27.5	45.	27.5	.....	....	....
Bismuth Solder	25.	50.	25.	.....	....	....
D'Arcet	50.	25.	25.	.....	....	....
Eutectic	52.5	15.5	32.	.....	....	96°C.
Eutectic	49.5	13.1	27.3	10.1	....	70-74°C.
Eutectic	51.6	....	40.2	8.1	....	91.5°C.
Eutectic	54.	26.	....	20.	....	103°C.
Eutectic	....	50.	32.	18.	....	145°C.
Fusible Tea Spoons	44.5	16.5	30.	.....	Hg, 5-10	....
Guthrie's	47.38	19.97	19.36	13.29	....	....
Lichtenberg	50.	20.	30.	.....	....	....
Lipowitz	50.	13.3	26.7	10.	....	....
Newton's	50.	18.75	31.25	.....	....	....
Onion's	50.	20.	30.	.....	....	....
Rose's	50.	22.	28.	.....	....	....
Rose's	35.	30.	35.	.....	....	....
Wood's	50.	12.5	25.	12.5	....	....

† *Reprinted from Hamlin and Turner, Chemical Resistance of Engineering Materials, 1923.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

G

G Acid. See 2-Naphthol-6:8-disulfonic acid. Occasionally used in old literature to mean 2-amino-8-naphthol-6-sulfonic acid (gamma acid) (q.v.).

G Salt. The sodium or potassium salt of 2-naphthol-6:8-disulfonic acid (G acid).

Gabbro. A finely to coarsely crystalline igneous rock composed mainly of lime-soda feldspar (labradorite or anorthite), pyroxene, and frequently olivine. Magnetite or ilmenite, or both, and apatite are accessory minerals. It is generally dark colored. California, Canada, Maryland, South Dakota and Virginia.

Gabian Oil. A very inflammable, mineral naphtha.

Gadolinia. See Gadolinium oxide.

Gadolinite (Ytterbite).
A natural complex silicate of glucinum, iron and the yttrium and cerium rare earth metals. Black, greenish-black, or brown; vitreous to greasy luster.
Constants: Sp.gr. 4.0 to 4.47; hardness 6.5 to 7.
Occurrence: United States (Arizona, Colorado, Texas), Germany, Scandinavia.

Gadolinium Gd. One of the rare earth (q.v.) metals.

Gadolinium Chloride $GdCl_3.6H_2O$.
Color and properties: White, deliquescent, prismatic crystals.
Constants: Sp.gr. 2.424.
Railroad shipping regulations: None.*

Gadolinium Nitrate $Gd(NO_3)_3.6H_2O$.
Color and properties: Triclinic crystals.
Constants: Sp.gr. 2.332; m.p. 91° to 92°C.
Railroad shipping regulations: Yellow label.

Gadolinium Oxalate $Gd_2(C_2O_4)_3.10H_2O$.
Color and properties: Monoclinic crystals.
Railroad shipping regulations: None.*

Gadolinium Oxide (Gadolinia) Gd_2O_3.
Color and properties: White amorphous hygroscopic powder. Absorbs carbon dioxide from the air.
Constants: Sp.gr. 7.407 (15°C.).
Slowly soluble in acids.
Railroad shipping regulations: None.*
See also Rare earths.

Gadolinium Sulfate $Gd_2(SO_4)_3.8H_2O$.
Color and properties: Monoclinic crystals.
Constants: Sp.gr. 3.01 (14.6°C.).
Railroad shipping regulations: None.*

Gadolinium Sulfide Gd_2S_3.
Color and properties: Yellow hygroscopic mass. Slowly decomposed by water and acids.
Constants: Sp.gr. 3.8.
Derivation: By heating the sulfate in hydrogen sulfide.
Railroad shipping regulations: None.*

Gahnite. See Spinel.

Galactonic Lactone, Dextro- $C_6H_{10}O_6$.
Color and properties: White crystals.
Constants: M.p. 112°C.; b.p.: Decomposes; optical rotation −73.0° immediately after solution, about +48° in equilibrium at 20°C.
Soluble in water and alcohol; slightly soluble in glycerol.
Derivation: From galactose by partial oxidation.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Wooden kegs; glass bottles.
Uses: Dentifrices; dentistry; oral preparations; organic synthesis.
Railroad shipping regulations: None.*

Galactose (Lactoglucose) $C_6H_{12}O_6$.
Color and properties: Colorless, crystalline tablets.
Constants: M.p. 170° to 171°C.
Soluble in water; slightly soluble in alcohol.
Derivation: By oxidation of dulcitol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Organic synthesis; medicine.
Railroad shipping regulations: None.*

Galalith (Erinoid). Trade name for one of the formaldehyde-casein products. It is known as artificial horn and is used as a non-inflammable substitute for ivory, tortoise-shell, bone, amber, coral, ebony and the like. It is also used as an insulator in electrical work.
Railroad shipping regulations: None.*

Galangae (Galangal; East India root; Chinese ginger).
Rhizome of Alpinia officinarum.
Habitat: China.
Grades: Technical; N.F.
Containers: Bales.
Uses: Medicine (aromatic stimulant similar in effect to ginger).
Railroad shipping regulations: None.*

Galangal. See Galangae.

Galangal Oil.
Color and properties: A yellowish-green to reddish-yellow liquid; aromatic cajuput-like odor; strong camphoraceous taste.
Chief known constituents: Cineole, pinene, eugenol.
Constants: Sp.gr. 0.921.
Soluble in alcohol and ether.
Derivation: Distilled from the rhizome of Alpinia officinarum found in Siam and Cochin China.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Culinary flavor.
Railroad shipping regulations: None.*

Galbanum.
Derivation: Gum resin obtained from Ferula galbaniflua.
Habitat: Persia, Levant.
Soluble in dilute alcohol.
Grades: Technical.
Containers: Tins.
Uses: Medicine (stimulant, expectorant and antispasmodic); perfumery.
Railroad shipping regulations: None.*

Galega (Goat's rue).
Whole plant of Galega officinalis.
Habitat: Southern Europe and western Asia.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Galena. See Galenite.

Galena, False. See Sphalenite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Galenite (Galena; Lead glance).
PbS, usually with some silver and frequently with sulfide of antimony, bismuth, cadmium. A soft, heavy, lead-gray mineral of metallic luster. Contains 86.6% lead. Soluble in concentrated nitric acid, also in excess of hot hydrochloric acid.
Constants: Sp.gr. 7.4 to 7.6; hardness 2.5.
Occurrence: Found throughout United States and Canada, Germany, England, Sweden, Sardinia.
Uses: The chief ore of lead. The silver-bearing deposits are the more frequently worked and both the lead and silver are recovered.

Gall, Hog.
Color and properties: A yellowish powder; disagreeable, bitter taste.
Soluble in water.
Derivation: Dried purified bile of the hog.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Gall, Ox (Fel bovis; Oxgall).
Color and properties: Yellowish-green, viscid liquid; unpleasant odor, disagreeable, bitter taste.
Derivation: Thickened bile of the ox.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine (in extract form to replace hepatic solutions).
Railroad shipping regulations: None.*

Galla, U.S.P. See Galls, nut.

Gallal (Aluminum Subgallate) $Al_4(C_7H_2O_5)_3.4H_2O$.
Color and properties: Brown powder.
Soluble in dilute acids; insoluble in water.
Derivation: Interaction of solutions of alum and sodium gallate.
Uses: Medicine (antiseptic astringent in ozena, unofficial).
Railroad shipping regulations: None.*

Gallic Acid (Galls, nut; Trioxybenzoic acid; 3:4:5-Trihydroxybenzoic acid). $C_6H_2(OH)_3CO_2H.H_2O$.
Color and properties: Colorless or slightly yellow, crystalline needles or prisms.
Constants: Sp.gr. 1.694; m.p. 222° to 240°C.
Soluble in alcohol and glycerol; sparingly soluble in water and ether.
Derivation: By the action of mold on solutions of tannin or by boiling the latter with strong acid or caustic soda.
Grades: Technical; U.S.P.
Containers: Technical and U.S.P.: 1 lb. cartons; 5, 25, 50 lb. boxes; 100 lb. kegs. U.S.P.: 140 lb. barrels; technical: 200 lb. barrels.
Uses: Photography; writing ink; dyeing; manufacture of pyrogallol; tanning agent and manufacture of tannins; paper manufacture; pharmaceuticals; process engraving and lithography.
Railroad shipping regulations: None.*

Gallipoli Oil. An inferior variety of olive oil. Used in the textile industries.

Gallipot Gum. A resin similar to Burgundy pitch, obtained from Pinus maritiana.

Gallocyanine. Coal-tar dye.

Galloformin. A hexamethylenetetramine-gallic acid compound used in medicine as a urine antiseptic. Unofficial.
Railroad shipping regulations: None.*

Gallogen (Ellagic acid) $C_{14}H_6O_8$.
Color and properties: Yellowish powder, odorless, tasteless.
Soluble in alkaline solutions; insoluble in acid or neutral solutions.
Uses: Medicine (intestinal astringent, diarrheas, unofficial).
Railroad shipping regulations: None.*

Gallotannic Acid. See Tannic acid.

Galls (Nutgalls; Galla, U.S.P.; Aleppo galls; Mecca galls; Turkey galls).
Excrescences on various kinds of oak trees resulting from the deposition of insect eggs.
Grades: The best grades (55 to 60% tannic acid) come from Persia, Syria, Turkey and Tripoli. The poorer grades come from Italy, France, Germany and Austria.
Color range from black through green to white, owing to different degrees of maturity, the darker being more mature and containing a greater percentage of tannin.
Containers: Wooden barrels; bags.
Uses: Source of gallic and gallotannic acids; tanning industry; ink manufacture; medicine; textile printing; pharmaceuticals.
Railroad shipping regulations: None.*

Galvanized Iron (Hot-dip process). Iron coated with zinc by dipping the metal into a bath of molten zinc held at a temperature somewhat above the melting point (810° to 875°F.). According to Speller, "Corrosion, Causes and Prevention," New York, McGraw Hill Book Company, Inc., **1926**, "the dross, i.e., the heavier semisolid zinc-iron alloys, which are formed during the dipping process, settles down in the bath and is readily removed by keeping a few inches of lead on the bottom of the kettle under the zinc. The dross floats on the surface of the lead. Too high a temperature causes the rapid formation of dross and results in a poor coating and wastage of the pot and contents.

"Hot-dip galvanizing is applied to a wide variety of steel and iron products. As the nature and thickness of the coating depend very largely upon the thickness and shape of the article, and upon the temperature and time of immersion in the bath, the practical details of application must be varied considerably to suit the material.

"In hot-dip galvanizing of pipe, a 'lift' of pipe is pickled in hot acid, rinsed in water, and then immersed in a fluxing bath consisting of a solution of zinc chloride, zinc ammonium chloride, or dilute hydrochloric acid. The metal surface must be free from oxides and other foreign matter before immersing in the zinc. A suitable flux is, therefore, essential in order to remove the last traces of such impurities. The lift is next taken from the flux bath and heated, after which the pipe is rolled into the zinc bath. The pipe remains in the molten zinc for several minutes until the iron reaches the temperature of the bath. It is then slowly withdrawn and air-cooled or cooled in water. Sometimes a considerable number of pipes is slowly removed endwise at the same time by means of an electromagnet. Galvanized pipe is usually removed from the zinc bath without wiping, as this gives a coating of the maximum thickness (2 to 3 ozs. per sq. ft. of coated surface), but when a thin, smooth coating is desired for bending, part of the zinc is sometimes removed by drawing the pipe through an asbestos or iron die and blowing out the inside with an air jet. The addition of a very small amount of aluminum to the bath in the hot galvanizing of pipe improves the fluidity of the zinc and gives a better appearance to the coating, but if used in excess it renders the flux less fusible and makes a poor coating. Over 0.1% aluminum reduces the durability of the zinc coating.

"Wire and sheets are galvanized by a somewhat similar but continuous process. In coating sheets, the metal is passed downward through a bath of molten ammonium chloride flux placed in a compartment on top of the zinc bath. It is then carried into the zinc and out again by

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

means of rolls. As the base metal is normally of thin gage, it acquires the temperature of the bath in a comparatively short time. The final thickness of coating is regulated mainly by the time of immersion, temperature of the bath, and by raising or lowering the last set of rolls which are partially immersed. Ammonium chloride is added to the surface of the bath at regular intervals to maintain the surface free from oxides and other solid impurities.

"The thickness of zinc on steel sheets usually varies from 0.55 to 1.25 ounces per square foot of coated surface and is regulated to suit the requirements to be met in subsequent forming operations. The ability of the coating to stand distortion naturally decreases with increase in thickness. A very small amount of tin is sometimes added to improve the spangle of zinc-coated sheets, but the spangled appearance of the finished sheet, in itself, is not a criterion of the durability of the coating.

"Galvanizing of wire by the hot-dip process is carried on continuously by passing the annealed wire into a cleaning bath of a mixture of equal parts of 18°Bé. hydrochloric acid and water, and then over a drier. When dry, the wire is drawn at a certain speed through a bath of molten zinc at a temperature of about 875°F. (468°C.). After cooling in the air, it is coiled on reels. The wire, on leaving the zinc bath, may be wiped by passing through an asbestos die so as to leave a coating of a thickness capable of standing the required amount of bending.

"An annealing operation has been developed by which the wire, immediately after it leaves the coating bath, is passed rapidly through a furnace heated to about 1,250°F. (677°C.). This apparently increases the ductility and adherence of the zinc coating so that a greater thickness may be carried without the danger of the coating flaking off in bending. After this annealing operation, the coating consists of the usual thin tlayer of zinc iron alloy ($FeZn_3$) next to the base metal, intermediate graded layers ($FeZn_7$ and $FeZn_{10}$) outside of this, and an outer layer with an iron content ranging from a 4% iron alloy mixture to a surface coating of approximately the same composition as the zinc bath.

"Flaking and cracking of zinc coatings which are being bent may be largely prevented by carrying on the operation at a temperature between 200° and 300°F. (93° and 149°C.). For instance, when galvanized pipe is being coiled, this temperature may be maintained by passing steam through the pipe.

"Hot-dip galvanizing has a soldering effect and may be used to make riveted vessels watertight. Zinc may be applied by this process up to about 3 ounces per square foot of coated surface, depending upon the thickness of the article, temperature of the bath, and the finishing operations.

"Compared with other zinc coating processes, the main limitations of the hot-dip process are: the large proportion of zinc-iron alloy present in the coating; the difficulty experienced in painting the coating unless it is roughened by weathering or other treatment; and from the manufacturer's standpoint, the wastage of zinc through the formation of dross. The hot-dip galvanizing process can be operated economically only on a large scale and with nearly continuous operation. The coating is so thick as to materially affect the fit of machined parts such as pipe threads unless it is partly removed mechanically. A rapid vibration of the article immediately after being taken from the bath is applied in some cases to produce a thin and uniform coating, such as is required on threaded parts.

"The advantage of this method is that zinc applied by the hot-dip process is much thicker than when applied by other processes. When exposed out-of-doors, it usually forms the most durable of all the zinc coatings. These coatings should, of course, be applied on the most durable kind of base metal and be of suitable thickness to meet the conditions of exposure. When the proper grade is selected with respect to the conditions of exposure, hot-dip zinc-coated steel usually gives satisfactory results in the atmosphere and is the most economical material to use. In water (especially when heated) and underground, all zinc coatings are much less lasting, as a rule, than in the atmosphere, depending upon the acidity or alkalinity, the oxygen concentration of the water, and the protective character of the deposits formed by the reaction between the water and the zinc."

Hot-dip galvanizing is applied to a wide variety of steel and iron products.

Galvano Lac. A powdered metal mixed with celluloid varnish.

Galyl. Tetraoxydiphosphoaminodiarsenobenzene, to which has been given the empirical formula: $C_{24}H_{22}O_8N_4P_2As_4$. Used in medicine and is stated to be less toxic than arsphenamine, though equally beneficial in the treatment of syphilis. Also used as an adjuvant to quinine in stubborn malarial fevers. Unofficial.
Railroad shipping regulations: None.*

Gambier. See Gambir.

Gambir (Gambier; Terra saponica; Pale catechu).
Dried, aqueous extract from the leaves and twigs of an Indian shrub, Ourouparia gambir.
Grades: 25% tanning extract; common; No. 1 Cubes; No. 2 Cubes; U.S.P.
Containers: Extract: Wooden barrels. Cube: Matted bags.
Uses: Textile dyeing; tanning industry; medicine (astringent).
Railroad shipping regulations: None.*

Gamboge (Cambogia; Gutti; Gomme-gutte; Gummigutt).
A gum-resin from Garcinia hanburii.
Habitat: East Indies.
Chief constituents: Cambogic acid, a resin and a gum.
Grades: Technical; U.S.P.
Containers: Wooden barrels.
Uses: Medicine (powerful cathartic); paint pigment.
Railroad shipping regulations: None.*

Gamene. See Madder.

Gamma Acid. See 2-Amino-8-naphthol-6-sulfonic acid.

Gamma Compounds. See Alpha compounds.
For specific gamma compounds see under name of compound.

Ganister. A highly refractory siliceous sedimentary rock used for the manufacture of refractory brick. Typical analysis: 98.20% SiO_2, 0.30% Fe_2O_3, 0.90% Al_2O_3, 0.15% CaO, 0.10% MgO.

Garanceaux.
Derivation: A preparation of madder from the exhausted madder, collected from the dye-becks.
Uses: Dyeing.
Railroad shipping regulations: None.*

Garancine. A dye material prepared from fresh madder.

Garantose. See Saccharin.

Garbage Pitch. See Stearin and fatty acid pitches.

Garcinia Oil. See Kokum butter.

Garden Angelica. See Angelica.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Garden Chamomile. See Anthemis.

Garden Lavender. See Lavender.

Garden Rosemary. See Rosemary.

Garden Sage. See Salvia.

Gardjan Balsam Oil. See Gurjun balsam oil.

Gargan Balsam Oil. See Gurjun balsam oil.

Garganine. A madder extract, obtained by use of the sulfuric acid process.

Garget. See Phytolacca.

Garlic. See Allium.

Garlic Oil.
Color and properties: Dark yellowish liquid; characteristic, exceedingly penetrating odor.
Chief known constituents: Allylpropyl bisulfide and diallyl bisulfide.
Constants: Sp.gr. 1.053.
Soluble in alcohol, ether and carbon bisulfide.
Derivation: Distilled from the bulb and herb of Allium sativum.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Flavoring; medicine (skin irritant).
Railroad shipping regulations: None.*

Garnet. A group of silicate minerals to which has been given the general formula: $R_3''R_2'''(SiO_4)_3$ where $R''=Ca,Mg,Fe'',Mn''$ and $R'''=Al,Fe''',Cr,Ti'''$.
Definite formulas have been written for the different garnets but they are not always pure, being, usually, isomorphous mixtures which may contain a high percentage of one type or no dominant percentage which then results in intermediate products.
Varieties:
Grossularite $Ca_3Al_2(SiO_4)_3$. Light shades of yellow or green, white, brown or rose-red. Includes cinnamon stone (essonite, hessonite); succinite; romanzovite.
Pyrope $Mg_3Al_2(SiO_4)_3$. Deep red to nearly black, often transparent. Sometimes known as Bohemian garnet, **cape ruby.**
Almandite (Alamandine) $Fe_3Al_2(SiO_4)_3$. Deep red to black. Includes part of precious and of common garnet.
Rhodolite. An intermediate product between alamandite and pyrope. Color, delicate rhododendron-red.
Spessaitite $Mn_3Al_2(SiO_4)_3$. Dark hyacinth-red to brownish-red.
Andradite $Ca_3Fe_2(SiO_4)_3$. Various shades of yellow and green, brownish-red, brown, grayish-black, black. Includes topazolite, demantoid, colophonite, melanite, pyreneite. With some manganese includes rothoffite, polyadelphite, bredbergite, aplome. There are also titaniferous and yttriferous varieties.
Uvarovite $Ca_3Cr_2(SiO_4)_3$. Emerald green.
Common Garnet. A mixture of grossularite, almandite and andradite.
Occurrence: United States (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Virginia, North Carolina, Kentucky, Arkansas, Michigan, Colorado, Arizona, New Mexico, California, Alaska), Canada, Norway, Ceylon, Italy, Switzerland, Germany, Finland, Elba, Siberia, Hungary, Australia, Mexico, South Africa, Sweden, India, Brazil, Greenland, France, Russia, Spain.

Garnet Lac. See Shellac.

Garnierite $H_2(Ni, Mg)SiO_4.H_2O$?
Deep green to pale greenish-white mineral, streak light green to white, varnish-like to dull luster. Soft, earthy, greasy to the touch. Composition is very variable. Contains 2 to 50% NiO, 35 to 52% SiO_2, 2 to 37% MgO, 10 to 20% H_2O. Noumeite refers to the dark and garnierite to the light-colored varieties. Partially soluble in hydrochloric and nitric acids.
Constants: Sp.gr. 2.27 to 2.8; hardness 2 to 3.
Occurrence: United States (Oregon), New Caledonia, Spain.
Uses: Important source of nickel (second only to nickel pyrrhotites).

Gas Black. See under Blacks, Carbon black.

Gas-engine Oils.
Varying grades of viscous neutral oils. Constants of four oils cited by one text book:

Straight reduced:

Gravity °Bé.	Flash point °F.	Fire test °F.	Cold test °F.	Saybolt viscosity
30.5	415	480	20	215
31.0	415	480	20	210
32.0	400	460	20	145

Stock loaded:

Gravity °Bé.	Flash point °F.	Fire test °F.	Cold test °F.	Saybolt viscosity
30.5	395	450	30	240

The following constants are also cited as suitable for large size gas engines:

Gravity °Bé.	Flash point °F.	Saybolt viscosity 70°F.
26 to 28	400 to 475	250

Railroad shipping regulations: None.*
See also Lubricants, United States Government Master Specifications.

Gas Lime. Gas works use slaked lime to purify the gas from carbon dioxide, carbon bisulfide and hydrogen sulfide. The spent lime contains about 49% calcium carbonate, 15% calcium sulfite, 18% calcium hydroxide, varying small amounts of magnesia, gypsum, iron and alumina, organic matter, siliceous matter, water, etc. It is used in agriculture for destroying wire worms and other pests, and for destroying matted grass, weeds, etc.

Gas Liquor. See Ammonia liquor.

Gas Oil.
A liquid petroleum distillate having a viscosity intermediate between that of kerosene and lubricating oil. It consists of a yellow to brown oily liquid, of kerosene-like odor, and is too heavy to be used as an illuminant while not having sufficient viscosity to be used as a lubricant.
Gas oil from Pennsylvania petroleum is stated to usually possess the following constants: Gr. 34° to 42°Bé.; flash point 230°F.; fire test 270°F.; cold test 20°F.
Gas oil is quoted in the various markets as follows: New York export market: Gr. 28° to 34°Bé.; Gulf export market: Gr. 26° to 30°Bé. or 30° to 32°Bé.; Pacific export market: Gr. 30° to 34°Bé.
Uses: Gas manufacture.
Railroad shipping regulations: None(?)*

Gasol. A proprietary name.
Color and properties: Yellowish, mobile liquid; gas-like odor.
Derivation: Condensed from casing-head gas by pressure.
Containers: Iron drums; tank cars.
Uses: Fuel-gas manufacture; illumination.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red gas label.

Gasoline (Petrol; Motor spirit).
Derivation: (a) By collecting the first distillate of crude petroleums. (b) From the distillation of petroleum, the products ranging in gravity from 50°Bé. to 90°Bé. and over, which are ex-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

tracted from the still gases by the compression method. There are two general grades of gasoline: The "normal" gasoline which exists naturally in petroleum and the "cracked" gasoline formed by the decomposition of the heavier products. (c) From natural gas, by compression and fractionation.

Grades: 50° to 90°Bé.; the grades used for automobile engines vary from 60° to 74°Bé. The heavier gravities are used for mixing paints and for blending with condensed gas gasoline. The lighter grades are used in illumination and in the manufacture of rubber cements.

United States Government Master Specifications for Lubricants and Liquid Fuels:

Aviation gasoline, fighting grade.

Color: Not darker than No. 25 Saybolt.

Sulfur: Shall not exceed 0.10%.

Avation gasoline, domestic grade.

Color: Not darker than No. 25 Saybolt.

Sulfur: Shall not exceed 0.10%.

United States Government Motor Gasoline.

Sulfur: Shall not exceed 0.10%.

Containers: Iron drums; tank cars.

Uses: Fuel for internal combustion engines; solvent; cleansing clothing, etc.; paint mixing; rubber cements.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label.

Gasoline Gas. A mixture of atmospheric air and light hydrocarbon vapor in varied percentages generally above the explosive limit. This gas has been developed to meet the requirements of isolated localities where the quantity of gas required is small so that the installation of the usual form of coal- or water-gas apparatus would not be profitable.

Typical analysis:

Illuminants	1.5%
C_6H_{14}	10.3%
O_2	18.5%
N_2	69.7%
Candle power	16.0%
B.t.u.	514

Railroad shipping regulations: Not shipped.

Gastrosan. See Bismuth bisalicylate.

Gaultheria (Checkerberry; Wintergreen; Deerberry; Boxberry; Teaberry).

The leaves of a small evergreen plant, Gaultheria procumbens.

Habitat: Canada and northeastern United States.

Chief constituents: Methyl salicylate, arbutin, ericolin, and urson.

Grades: Technical.

Containers: Bales; boxes.

Uses: Source of oil.

Railroad shipping regulations: None.*

Gaultheria Oil (Wintergreen oil, natural; Checkerberry oil).

Color and properties: Colorless, yellowish or reddish liquid; characteristic strongly aromatic odor quite distinct from that of betula oil; sweetish, warm and aromatic taste.

Chief known constituents: Methyl salicylate; a paraffin; a ketone; an alcohol; an ester.

Constants: Sp.gr. 1.180 to 1.193 at 15°C.; optical rotation —0° 25′ to —1°; refractive index 1.535 to 1.536; saponification value 354 to 365 =96 to 99% methyl salicylate.

Solubility in alcohol: In 6 to 8 vols. of 70% alcohol.

Derivation: Distilled from the leaves of Gaultheria procumbens.

Adulteration: Mineral oil; betula oil; artificial methyl salicylate.

Uses: Flavoring compounds; medicine; perfumery; confectionery.

Railroad shipping regulations: None.*

Gaultheria Oil, Artificial. See Methyl salicylate.

Gear-case Oil.

Constants, cited by one textbook, of one steam-refined cylinder stock used for this purpose are gravity 25°Bé.; flash point 610°F.; fire test 710°F.; cold test 30°F.; viscosity (Saybolt) 24.5.

Railroad shipping regulations: None.*

See also Lubricants, United States Government Master Specifications.

Gedanite. A resin resembling rosin, not containing succinic acid. Found on the shores of the Baltic.

Gedda Gum. A gum very similar in appearance to the inferior kinds of Arabic gums.

Railroad shipping regulations: None.*

Gelatin. See Glue and gelatin.

Gelatin Bengal. See Agar-agar.

Gelatin Ceylon. See Agar-agar.

Gelatin, Chinese. See Agar-agar.

Gelatin, Chromatized. See Glue and gelatin.

Gelatin, Explosive. A powerful explosive formed by mixing collodion cotton with about nine times its weight of nitroglycerin, the product being a gelatinized mass. It is less sensitive to shock and friction than ordinary dynamite and at one time was largely used. Its use is now being superseded, to a large extent, by gelatin dynamites since it is too shattering in its action and, due to its elastic character, it does not completely fill bore holes.

Railroad shipping regulations: High explosive.

Gelatin, Fish. See Glue and gelatin.

Gelatin, Glycerinated. See Glue and gelatin.

Gelatin, Insoluble. See Glue and gelatin.

Gelatin, Iodized. See Iodyloform.

Gelatin, Japanese. See Agar-agar.

Gelatin, Nutrient. A gelatin used for cultivating bacteria. It contains 10% beef broth.

Gelatine Gum XX. Proprietary name for a gum used for sizing and finishing fabrics.

Gelatinized Oil of Vaseline. Made by heating vaseline oil to about 200°C. and adding a small amount of soap.

Gel-Coalites. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
X, L.F.	A	6
Z, L.F.	A	6

Railroad shipping regulations: High explosive.

Gelite I, L.F.

A United States permissible explosive classified by the United States Bureau of Mines as follows:

Volume of poisonous gases: Class A.

Characteristic ingredients: Class 6.

Railroad shipping regulations: High explosive.

See Explosives, permissible.

Gellert Green. A pigment made by roasting and igniting metallic cobalt with zinc oxide and potassium nitrate.

Gelobel.

A United States permissible explosive classified by the United States Bureau of Mines as follows:

Volume of poisonous gases: Class A.

Characteristic ingredients: Class 6.

Railroad shipping regulations: High explosive.

See Explosives, permissible.

Gelsemine $C_{20}H_{22}O_2N_2$.

Color and properties: Yellowish-brown powder. Soluble in alcohol.

Derivation: From the rhizome and root of Gelsemium sempervirens.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Gelseminine $C_{22}H_{26}N_2O_3$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 172°C.
Soluble in benzene; insoluble in water.
Derivation: By extraction from the root of Gelsemium.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (depressant of the spinal nerve centers).
Railroad shipping regulations: None.*

Gelsemium (Yellow jasmin; Wild woodbine; Carolina jessamine).
Color and properties: Yellow masses.
Chief constituents: Gelsemine, gelseminine and gelsemic acid.
Derivation: The dried rhizome and roots of Gelsemium sempervirens.
Habitat: Southern United States.
Grades: Technical; U.S.P.
Containers: Boxes; tins.
Uses : Medicine; extraction of gelsemine and the alkaloid gelseminine.
Railroad shipping regulations: None.*

Gen-el-ite.
The trade-name of a self-lubricating bearing metal said to contain 40% by volume of graphite.

Generals. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
I	A	I a
6-X	A	I a

Railroad shipping regulations: High explosive.

Genthite. A variety of garnierite (q.v.) corresponding to the formula $2NiO.2MgO.3SiO_2.6H_2O$.

Gentian (Yellow gentian; Bitter root).
Dried rhizome and roots of Gentiana lutea.
Habitat: Mountainous regions of Europe and Asia Minor.
Grades: Technical; U.S.P.
Containers: Tins.
Uses: Medicine (for its local effect on mucous membrane of alimentary tract); liqueurs.
Railroad shipping regulations: None.*

Gentianin (Gentisin).
A principle of gentian roots.
Tasteless yellowish crystals, sparingly soluble in alcohol.
Uses: Medicine (unofficial).

Gentisin. See Gentianin.

Genuine Wrought Iron. A trade designation for wrought iron containing 98.5% iron. It offers good resistance to hot and cold concentrated sulfuric acid, all concentrations of hot and cold sodium and ammonium hydroxides, and mine and sea waters.

Geocronite $5PbS.Sb_2S_3$.
Light lead-gray secondary mineral formed in lead and antimony veins.
Constants: Sp.gr. 5.3 to 6.5; hardness 2.5 to 3.5.
Occurrence: United States (California), Sweden.

Geoform. See Methylenediguaiacol.

Geosote (Guaiacol valeriate) $C_6H_4OCH_3OCOC_4H_9$.
Color and properties: Oily, mobile liquid, pale yellow color. Less toxic and irritant than guaiacol.
Constants: Sp.gr. 1.038; b.p. 240° to 260°C.
Soluble in alcohol, ether, benzene; insoluble in water.
Uses: Medicine (phthisis, gastro-intestinal antiseptic in fermentative dyspepsia, diarrhea, unofficial).
Railroad shipping regulations: None.*

Geraniol $C_9H_{15}CH_2OH$.
Color and properties: Pale yellow, liquid oil; pleasant geranium-like odor.
Constants: Sp.gr. 0.8812; m.p. —15°C.; b.p. 230°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From geranium oil, also from citronella and palmarosa oils by forming the double compound with calcium chloride.
Grades: Technical.
Containers: 1, 5, 10 lb. bottles; 25, 50 lb. tins.
Uses: Perfumery.
Railroad shipping regulations: None.*

Geranium (Cranes-bill; Storksbill; Alum root).
Dried rhizome of Geranium maculatum.
Habitat: Canada and eastern United States, south to Georgia.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (astringent).
Railroad shipping regulations: None.*

Geranium, Blood. See Sanguinaria.

Geranium Crystals. See Phenyl oxide.

Geranium Oil.
Color and properties: Pale yellowish or greenish liquid; exceedingly agreeable rose-like odor.
Chief known constituents: Geraniol; citronellol.
Constants: Sp.gr. 0.886 to 0.898; optical rotation —7° to —12°.
Soluble in alcohol and ether.
Derivation: Distilled from the herb of several species of Pelargonium, especially P. graviolus, P. capitatum and P. odoratissumum.
Method of purification: Rectification.
Grades: Technical.
Containers: Copper flasks, glass bottles.
Uses: Perfumery.
Railroad shipping regulations: None.*

Geranium Oil, Indian. See Palmarosa oil.

Geranium Oil, Rose. A geranium oil prepared in southern France by adding rose petals to the pelargonium plants during distillation.

Geranium Oil, Terpeneless.
Concentration: About 1.5 to 2 times that of the ordinary geranium oil.
Constants: Sp.gr. 0.89 to 0.90; optical rotation —1° to —2°.
Solubility in alcohol: 60 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Geranium Oil, Turkish. Palmarosa oil (q.v.). The name Turkish geranium oil was formerly applied to this oil because it was the custom to ship it from India to Red Sea ports. Thence it was sent by land to Constantinople where it was distributed to other markets. This practice has now been superseded by direct shipments from India.
Railroad shipping regulations: None.*

Geranyl Acetate $C_9H_{14}CH_2OHC_2H_3O_2$.
Color and properties: Sweet, fragrant, clear, colorless liquid, odor of lavender.
Constants: Sp.gr. 0.917; b.p. 128° to 129°C. (16 mm.).
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) Constituent of several essential oils. (b) Heating geranyl and sodium acetate with acetic anhydride.
Grades: Technical.
Containers: Copper flasks; glass bottles.
Uses: Perfumery.
Railroad shipping regulations: None.*

Geratacaca. See Manaca.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

German Black. See under Blacks, Vegetable black.

German Chamomile. See Matricaria.

German Sarsaparilla. See Carex.

German Silver (Victory silver; Pack fong; New silver). An alloy of zinc (19-44%), nickel (16-22%), and copper.

German Silver Solder.
A solder usually composed of German silver and zinc in the proportions of 5 parts to 4.

Germanium.
Color and properties: Grayish-white metal.
Constants: Sp.gr. 5.46; m.p. 900°C. (approximately); does not volatilize below 1,350°C.
Derivation: Recovered from residues from refining of zinc.
Found also in two ores, argyrodite and germanite.
Uses: Medicine (in form of dioxide for treatment of pernicious anemia); metal is used in radio as a high-resistance element.

Germantown Black. See under Blacks, Lampblack.

Germol. A cresol-soap disinfectant. Phenol coefficient, without organic matter, is stated to be 2.12, with organic matter, 1.79.
Railroad shipping regulations: None.*

Getah Wax. See Fig-tree wax.

Geyserite. See Opal.

Ghatti Gum. In India the name "Ghatti" is used to denote those gums produced in India itself. In European commerce the name "Ghatti" or "Gatty" is used to denote the gum derived from Anogeissus latifolia and other species. Since no different terminology is used for the products from the different species the gums offered under this name differ considerably in color and properties.

Giant Granite. See Pegmatite.

Gibbsite (Hydrargillite) $Al(OH)_3$ or $Al_2O_3.3H_2O$.
A natural hydrated alumina. Color, white, greenish, reddish, yellow; streak, white; faint vitreous luster. Contains 65.4% Al_2O_3, balance water. Found mostly as encrusting masses. Hydrargillite is the term usually applied to the crystals. See also Bauxite.
Constants: Sp.gr. 2.3 to 2.4; hardness 2.5 to 3.5.
Occurrence: United States (Massachusetts, New York), Asia Minor, Norway, India, Russia.

Gigily Oil. See Sesamé oil.

Gilder's Size. Bleached Cologne glue in thin leaves. See Glue and gelatin.

Gilders Whiting. See Whiting.

Gillenia (American ipecac; Indian physic).
Derivation: Root of Gillenia triofoliata.
Habitat: Canada to Florida.
Grades: Technical.
Containers: Boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Gilsonite (Uintaite; Uintahite).
An asphaltite (q.v.) found only in the United States, in Utah and Colorado. One of the purest natural bitumens. It mixes well with the fatty acid pitches in all proportions.
Color and properties: Color in mass black; conchoidal fracture; bright to fairly bright luster; brown streak.
Constants: Sp.gr. (77°F.) 1.05 to 1.10; hardness (Moh's scale) 2; penetration (77°F.) 0; fusing point (K & S) 250° to 350°F., (B & R) 270° to 370°F.; behavior on heating in flame, softens and flows; trace to 1% mineral matter.
Soluble in all proportions of carbon bisulfide.
Grades: "Selects" or "firsts," conchoidal and lustrous fracture; "run of mine" or "seconds," semi-conchoidal and semi-lustrous fracture.
Uses: Coach and other varnishes; paving; insulation; waterproofing.
Railroad shipping regulations: None.*

"Gimco." See Mineral wool.

Gingelly Oil. See Sesamé oil.

Ginger (Zingiber).
Color and properties: Whitish to pale buff, irregularly branched pieces; aromatic odor; aromatic, burning taste.
Chief constituents: Ginger oil (volatile), a resin and gingerol.
Derivation: The dried rhizome of Zingiber officinale; habitat: Southern Asia, West Indies and Africa; cultivated in all tropical countries.
Grades: Technical; U.S.P.
Containers: Tins; boxes.
Uses: Medicine (stimulant and carminative); confectionery; condiment; soft drinks.
Railroad shipping regulations: None.*

Ginger-grass Oil.
An oil that was formerly regarded as being an inferior, adulterated grade of palmarosa oil (q.v.) but which is now recognized as a distinct entity. It has a pronounced ginger odor.
Chief constituents: Geraniol, dihydrocuminol, phellandrene, dipentene, limonene, carvone.
Constants: Sp.gr. 0.90 to 0.953 at 15°C.; optical rotation usually between +20° and +30°, but as wide variations as −30° to +54° have been observed; refractive index 1.478 to 1.493; acid value up to 6.2; ester value 8 to 29, after acetylation 120 to 200.
Solubility in alcohol: In 2 to 3 vols. of 70% alcohol; in 0.5 to 1.5 vols. and more of 80% alcohol.
Adulteration: Mineral oil, turpentine and gurjun balsam oil are the chief adulterants. Their presence is indicated by a change in the specific gravity and the lowering of the solubility. Optical rotation is affected by gurjun balsam oil.
Derivation: By distilling Cymbopogon martini var. sofia.
Containers: 1, 5, 10 lb. bottles; 25-28 lb. tins.
Uses: Perfumery.
Railroad shipping regulations: None.*

Ginger Oil.
Color and properties: A pale yellow liquid; characteristic odor; aromatic, somewhat burning taste.
Chief known constituents: Citral, borneol and phellandrene.
Constants: Sp.gr. 0.880 to 0.885; optical rotation −25° to −45°.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the rhizome of Zingiber officinale.
Grades: Technical.
Containers: Iron drums.
Uses: Flavoring; preparation of liqueurs.
Railroad shipping regulations: None.*

Ginger Oil, Terpeneless.
Concentration: About 5 to 10 times that of the ordinary ginger oil.
Constants: Sp.gr. about 0.90 to 0.91.
Railroad shipping regulations: None.*

Gingili Oil. See Sesamé oil.

Gingily Oil. See Sesamé oil.

Ginseng (Panax; American ginseng).
Derivation: Root of perennial herb, Panax quinquefolium.
Habitat: North America.
Grades: Technical.
Containers: Bags.
Uses: By the Chinese, medicinally.
Railroad shipping regulations: None.*

Girasol. See Opal.

Glance Pitch (Manjak).
An asphaltite (q.v.) resembling gilsonite in external appearance but having a decidedly black streak instead of a brown one. It also has a larger percentage of fixed carbon. The best known glance pitch comes from the Barbadoes,

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

the material found on the surface of the veins being harder, more brittle and of a higher fusing point than that found at the lower mine levels.

Color and properties: Black in mass; conchoidal to hackly fracture; bright to fairly bright luster; black streak.

Constants: Sp.gr. at 77°F. 1.10 to 1.15; hardness (Moh's scale) 2; penetration at 77°F. 0; fusing point (K & S) 250° to 350°F., (B & R) 270° to 370°F.; behavior on heating, softens and flows in flame; mineral matter less than 5%.

Soluble in carbon bisulfide (usually greater than 95%).

Railroad shipping regulations: None.*

See also Syrian asphalt.

Glanzstoff. See Rayon.

Glass.

Composition: A fused, amorphous, transparent or translucent mixture of silicates made from silica and various alkalis, alkali-earths, metal oxides and salts. Silica is usually obtained in the form of sand; soda ash, salt cake and various potassium salts are the alkaline bases used; lime and (occasionally) barium carbonate are the alkaline earths; and lead, aluminum, arsenic, zinc, iron, manganese, and cobalt are metals sometimes used, usually in the form of their oxides. Glass is generally divided technically into lime glass or lead glass according to the presence of these elements. The former is cheaper, harder, more resistive and less fusible than the latter, which has greater luster and brilliancy but is heavy and expensive and is used chiefly for cut ware and for optical purposes.

Types of Glass:

Window Glass. It is made by one of four methods; three of these are mechanical methods and differ only in the means of preparing the sheet; the fourth method is the hand method, still in use by agreement, rather than because of its merit. In the three mechanical methods, which may justly be considered superior to the hand method, the molten glass is obtained by heating together soda ash, sodium sulfate, sand, and cullets (broken glass), in a large tank-shaped furnace; in the hand method, clay pots are used. One of the mechanical processes draws by means of machinery tall cylinders, 40 feet high by 28 inches in diameter; these are later cut into shorter cylindrical sections, halved, and flattened in an annealing furnace. Another draws a flat sheet of glass from the tank containing the fused material, by means of a flat iron bar. A third method provides a flat sheet also, drawn up vertically, and formed by forcing a clay block with the proper slit against the molten glass. This last method is often called the extrusion method. The old way of making window-glass was to blow (from the lungs) at the end of an iron blow-tube or pipe, handled by hand, cylinders not over five feet long nor over 15 inches in diameter. The glass had to be reheated several times, reblown, then the two ends removed. The cylinder so obtained was cut lengthwise, and allowed to flatten in a furnace similar to the one used in connection with the tall cylinders.

Glass Tubing. Liquid glass is flowed out at one end of the tank furnace over a nozzle-like spout through which compressed air is introduced. The glass is drawn out by a machine and travels a considerable distance; as it travels it is annealed and cooled. When cold enough, it is cut automatically into prescribed lengths. The size of the tubing and the thickness of wall are determined by the viscosity of the glass and by the air pressure. When rods are to be made, the air is shut off. The product of this operation is remarkably uniform as to size and wall thickness. The capillary tubings such as are used for thermometers are drawn in a similar way.

Plate Glass. The composition of plate glass is the same as that of window glass; it is a lime-soda silicate, but is thicker than window glass, for the sake of strength in the finished plate, and also to prevent, or better, reduce breakage in the long process of grinding and polishing which it invariably undergoes. In fact the distinguishing feature of plate glass is that it is free of distortions, that its surfaces are absolutely true.

Plate glass is produced in two ways: (1) A potful of molten glass is poured onto a cast-iron table built of segments of thick castings, perfectly fitted; the glass flows to the edge, where a rim prevents its running off; a heated roller is passed over the glass, leveling it. While still hot and plastic, the plate is lifted slightly and shoved into the annealing furnace, where it is cooled slowly over a period of three days. While cooling in the lehr, the plate lies on sand; on removal from the lehr, the under surface has adhering sand, the upper surface is wave-like due to the rolling. It is ground by revolving flat disks, with sand as abrasive; coarse sand is used first, then successively five grades of sand decreasing gradually in coarseness. After the sand treatment, emery is applied, also in several grades, the finest one last. The plate now looks like the familiar ground glass. It is polished by means of rouge which gives the surface perfect reflection.

After one side has been so treated, the plate is turned over and the other side undergoes the same grinding with sand, then emery, and the polishing with rouge. The polished side is protected from scratches by mounting the plate in wax, or plaster of Paris.

During the grinding and polishing operations, about one-half of the thickness of the plate is lost, so that if the finished plate is to be 5 mm. thick, it must be cast of 10 mm. thickness.

(2) Continuous sheet process: The glass is flowed from the furnace onto the metal table, and is leveled by passing under two nichrome cylinders, the second smaller than the first. The glass sheet continues into the lehr, 500 feet long, where it cools from about 1,100°F. (593°C.) at the entry to 100°F. (38°C.) at the exit. It is cut into suitable sizes, mounted in plaster of Paris, and ground and polished as single plates. This process is well adapted only for fairly small pieces of uniform size.

Optical Glass. Optical glasses are of two varieties: (a) flint glass, a lead-potassium glass having low dispersion and high refraction; (b) crown glass, a lime-soda glass having high refraction and low dispersion. For a crown glass batch the materials would be approximately:

	Per Cent
White sand, low in iron, high in SiO_2 content	69
Precipitated calcium carbonate	16
Soda ash	14
Other ingredients (As_2O_3, Sb_2O_3)	1

For a flint glass batch, the materials are, for example:

	Per Cent
White sand	43
Potash	12
Litharge (PbO)	44
White arsenic (As_2O_3)	1

The batch is mixed by hand with wooden paddles in wooden or zinc-lined boxes, 3 ft. by 12 ft. The iron content in the mixed materials must be less than 0.01% Fe; it will then be about the same percentage in the finished glass.

On substituting various other metals (in the form of oxides or salts) for the lime, the properties of the resulting glass are modified:

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Litharge glass (PbO) has high refraction, high dispersion.

Barium glass has high refraction, lower dispersion.

Zinc glass has high refraction, and dispersion lower than barium glass.

Boron glass has low refraction, low dispersion.

The process of manufacture is as follows:

The pots, made of a mixture of white clays of high purity, are aged and heated in successive stages. The cold, mixed materials are introduced into the pot and melted with carefully regulated stirring until the temperature of the glass is approximately 1,000°C. It is then cooled rapidly to 600°C. to prevent crystallization with consequent loss of transparency and to prevent convection currents which would destroy the homogeneity. The slow cooling from 600° down is an annealing process. The pot is broken into chunks, sorted, melted into small slabs, again sorted and tested and ground and polished.

Cut Glass. Lead glass is used in the manufacture of cut glass because of its brilliancy. The article is shaped by pressing or blowing, cooled in the annealing furnace, and passes thence into the cutting room. The design is drawn on the glass with a grease pencil, and is then cut in by means of a small metal or alundum wheel and emery; the surface of the cut is next polished with rouge applied on a wooden wheel. True cut glass may be distinguished by its sharp edges; imitation pressed ware lacks these. For cheaper varieties, the design is pressed in and just enough cutting and polishing done to give the characteristic edges. The cutting of glass is also combined with etching to good advantage.

Frosted Glass Frosted glass is glass with a mat finish; light passing through a frosted globe is pleasantly diffused. For large pieces, a sand blast may be used; the original method, however, and the one still largely in use, is the hydrofluoric acid bath. The article (for instance, the light dome, largely used in closed automobiles, made from soda-lime glass by pressing) is immersed for a number of minutes in a bath having the following composition:

Water	1,000 cc.
Acid potassium fluoride	250 grams
Hydrochloric acid (sp.gr. 1.18)	250 grams
Potassium sulfate	140 grams

After the immersion the glass is rinsed in water and dried. Etching may be done in the same way, except that only part of the glass is exposed, the rest is covered by a layer of paraffin. A frosted etching results if a bath similar to the above is used; a clear etching if the same bath is diluted; the difference is due to the fact that fluosilicates, which cause the mat finish, are dissolved in the diluted bath. The bath is usually at room temperature; the effect may be varied by changing the temperature, the time of immersion, the concentration of the acid, and the composition of the glass.

Glass Bottles. Bottles were formerly made by hand; a worker could produce about 300 bottles a day. Automatic bottle blowing machines have been developed which produce in eight hours 6,000 bottles. The method is essentially the same; a gob of hot glass is forced out by air pressure against the walls of a mold. The warm bottle is cooled in a lehr containing an automatic conveyor. White bottles are made from glass similar in composition to window glass, but somewhat richer in silica; fruit jars, tumblers, battery jars also. Amber-colored bottles are made from glass containing iron oxide, after the addition usually of pyrolusite (MnO_2) in generous proportion. A small amount of manganese produces a violet color in white glass, and nullifies a slight green shade due to a small amount of iron; for that reason pyrolusite is commonly called the glassmakers' soap; it is still extensively used in that way. Glass made colorless in this way cannot be used in optical instruments.

Thermal Glass. See Glass, Pyrex, probably the most important example of this type.

Wire Glass. Wire glass has become important since glass has been widely used for factory roofs and windows; it is made by rolling into a softened sheet of heavy glass a netting of wire, then annealing in the usual way. Such glasses have the important advantage that they may crack (as in a fire) but that they will remain suspended.

Colored Glass. Used in railway and maritime signals, automobile tail lights, colored tableware and colored windows.

The practice in making red automobile tail lights will serve as example of manufacture for the smaller pieces. A batch of the red glass is prepared in closed pots such as are used for common window glass; the composition may be, for instance, soda-zinc, with 1% selenium. The pot is served by three men; one takes gobs of clear glass from the inner ring in the pot, and places them in a mold, disconnecting the gob by means of shears from the pipe. The second man operates the die which, with the mold, forms the finished shape. The third man places the shapes on a flat tool and carries them in the lehr. In order to obtain the red with selenium, it is essential that a small amount of cadmium sulfide be added to the raw materials when mixed at the start; the selenium is added after the glass is molten.

Ruby red may be produced by adding cuprous oxide to a potash-lead glass; on cooling the glass is practically clear; it must be reheated in order to develop the splendid red color. Gold ruby is made by adding gold chloride to potash-lead glass, cooling and then reheating to develop the wine-red color. The gold ruby color is also known as the Purple of Cassius. In the glasses just given the color is due to the colloidal state of the copper and gold; it is in the study of gold ruby glass that Zigmondy made the observation which has led to the present important knowledge of the colloidal state of matter, namely that the color was due to highly dispersed particles of gold, visible in the ultra-microscope.

Yellow glass may be made by adding selenium to soda-lime glass. The deep blue color of cobalt is well known; it is obtained from cobalt oxide added to soda-lime glass; a greenish-blue is made by adding cupric oxide instead. Milk glass may be made by adding a mixture of calcium fluoride and alumina to soda-lime glass. Black glass is made by using an excessive amount of pyrolusite and iron oxide mixed. Green glass owes its color usually to chromium, added as oxide or as dichromate.

Glass, Hailuxo. A British glass used for chemical apparatus.

Glass, Liquid. See Sodium silicate.

Glass, Pyrex.

Registered trade name applied to various borosilicate glasses of American manufacture. Their low expansion coefficient renders them indifferent to sudden and wide-range temperature changes—a feature which, with their high mechanical strength, enables them to withstand both the mechanical shocks of rough handling and the temperature shocks of a hot liquid impinging upon the cold glass.

Physical characteristics: Linear coefficient of expansion 0.0000032 between 19° and 350°C.; elasticity coefficient 6,230 kg. per sq. mm.; hardness-scleroscope 120; sp.gr. 2.25; specific heat 0.20; refractive index 1.4754; dispersion

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

0.00738; light and heat transmission higher than the best plate glass.

Softening temperature: Softening does not commence at below 600°C., and for a limited time, these glasses can be used safely at temperatures somewhat higher. At a temperature of about 800°C., a vertically suspended pyrex rod 1 mm. in diameter elongates of its own weight at the rate of 1 mm. per minute.

Heat transfer: (Higher than would be expected from their thermal conductivity) 0.0027 c.g.s. units. Laboratory measurements show that copper (which has a thermal conductivity 300 times greater) only condenses 2.5 times as much as these glasses at rates of flow customary in plant practice.

Electrical characteristics: Dielectric strength 35 kv. per 100 mil. thickness; dielectric constant 4.48 (30,000 cycles); phase angle difference 0.16° (30,000 cycles); power factor 0.28% (30,000 cycles); electrical resistivity (volume) greater that 10^{14} ohm-cc.; electrical resistivity (surface) at 34% humidity, 10^{14} ohms at 84% 14 x 10^8 ohms.

Corrosion resistance: Resistant to the attack of acids, with the exception of hydrofluoric and glacial phosphoric. Surprisingly stable in presence of alkalis.

Sulfuric acid. Concentrated sulfuric acid at its boiling point dissolves in 4 hours 0.000002 gram per sq. cm. per hour.

Hydrochloric acid. Constant boiling hydrochloric acid dissolves 0.000006 gram per sq. cm. per hour at boiling temperature. Both this figure and the one for sulfuric acid relate to initial surface attack, as after a few hours a state of practical stability is reached.

Acetic anhydride. Shows no measurable attack after 5 hours at the fuming temperature.

Perchloric acid. Fumed down to dryness in 1½ hours, the loss is 0.00001 gram per sq. cm.

Caustic soda solutions: (Average values)

6 hours boiling 0.1N soln., 0.0005 gram per sq. cm. loss.

6 hours boiling 0.5N soln., 0.0012 gram per sq. cm. loss.

6 hours boiling 5% soln., 0.0022 gram per sq. cm. loss.

6 hours boiling 35% soln., 0.0032 gram per sq. cm. loss.

A 20% caustic soda solution, held for 100 hours at 49°C., showed a loss of 0.00246 gram per sq. cm.

Uses:

Industrial

Chemical manufacture: Tubes for horizontal and vertical coolers, heaters and condensers, and for Hart nitric acid condensers, tubes and return bends for atmospheric condensers; socket pipes for conveying gases and liquids; socket tower sections; "S" bends and "U" bends; plates and bonnets for fractionating and reaction columns; pulsometer tubes and "monkey" pumps; sight cylinders for pipe lines; sight glasses; sheets for lookboxes; balloon flasks and retorts; cascade dishes and pans; drying trays; pots and jars; bottles; carboys.

Electro-chemical manufacture: Cell thimbles; brine wells; liquor and gas connectors; cooler pipes for sodium hypochlorite; inter-cell coolers; cyanide plating jars.

Silk and rayon manufacture: Corrugated reels and rollers; Godet wheels; guides; bleach coolers; piping.

Electrical: Power transmission, lead-in, communication line, bus-bar, radio transmission, stand-off and antenna, insulators; inductance supports; counterpoise insulators.

Miscellaneous: Dielectric tubes for ozone generators; fruit-juice sterilizer tubes; motion-picture developing tanks (tubular type); rollers for plating machines; gage tubes for hot solutions; instrument tubing; neon-light tubing; vacuum-bottle blanks; battery jars.

Domestic: Cooking utensils.

Glass, Soluble. See Sodium silicate.

Glass, Volcanic. See Obsidianite.

Glass, Water. See Sodium silicate.

Glass Wool. A fibrous wool-like material composed of fine filaments of glass intermingled like ordinary wool. Used in chemical laboratories. Also used in some producer-gas plants as a dust filtering agent.

Glass Works Mold Oil. An oil having similar properties to those given under air compressor oils (q.v.) is stated to be suitable for this purpose.

Glauberite. A natural sodium-calcium sulfate, $Na_2SO_4.CaSO_4$. Found in Arizona, New Mexico.

Glauber's Salt $Na_2SO_4.10H_2O$.

The hydrated grade of sodium sulfate sometimes referred to commercially as crystallized sulfate of soda. It is produced either as large, transparent crystals (sp.gr. 1.462 to 1.48) or as small needles similar in appearance to Epsom salts. Contains 19.3% Na_2O, 24.8% SO_3, balance water. On exposure to air it will lose water and turn to a white powder. It is more easily soluble in water of ordinary temperatures than the anhydrous salt and for this reason is sometimes used in preference to the latter. There is also another hydrated sodium sulfate corresponding to the formula $Na_2SO_4.7H_2O$. See also Sodium sulfate.

Uses: Textile dyeing.

Glauconite (Greensand). Essentially a hydrous silicate of iron and potassium, but the material is usually a mixture, and consequently varies much in composition. The potash ranges from 2.2 to 7.9%. See Marl.

Glaucophane $NaAl(SiO_3)_2(FeMg)SiO_3$.

One of the amphibole group of minerals. Color, various shades of blue ranging from light blue to deep blue or bluish-black. Vitreous to pearly luster; grayish-blue streak.

Constants: Sp.gr. 3.0 to 3.1; hardness 6 to 6.5.

Occurrence: United States (California), Greece, Corsica, Japan, Switzerland.

Glazes. A term used in the ceramic industry. According to the sense in which it is used it may mean: (a) a vitreous coating on finished pottery or enamelware, (b) the mixed and powdered dry materials of the batch to be used for producing the vitreous coating, (c) an emulsion of these materials suspended in water ("wet glaze"). Glazes may consist of common salt or feldspar but are more usually mixtures of native silicates such as feldspar, kaolin, Cornish stone with flint, sand, cullet, chalk, borax, soda, white lead, red lead, or litharge. Oxides of cobalt, copper, iron and manganese are also used for coloring purposes. See also Frit.

Glazier's Salt. Potassium sulfate (q.v.).

Glazing Glue. See Glue and gelatin.

Glidin. Albuminous preparation made from wheat flour. Albumin content has not been definitely ascertained, figures of 98 and 30% being given. Used in medicine as a nutrient, greatest use is to form chemical combinations with irritant drugs.

Railroad shipping regulations: None.*

Glidin, Iodized. See Iodoglidin.

Glonoin Oil. See Nitroglycerin.

Gloss Oil. A poor varnish consisting of a solution of rosin in benzine.

Glucase. See Maltase.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Glucinum (Beryllium) Gl.
Constants: Sp.gr. 1.85; m.p. 1,280°C.
Soluble in acids.
Derivation: By electrolysis of the double fluoride of glucinum and potassium.
Grades: Technical.
Containers: Boxes.
Uses: Glucinum salts; copper alloys, used in musical instruments.
Railroad shipping regulations: None.*

Glucinum Nitrate (Beryllium nitrate) $Gl(NO_3)_2.3H_2O$.
Color and properties: White to faintly yellowish, deliquescent mass.
Constants: M.p. 90°C.
Soluble in water.
Derivation: By the action of nitric acid on glucinum oxide, with subsequent evaporation and crystallization.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Chemical reagent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Glucinum Ore. See Beryl.

Glucinum Oxide (Beryllium oxide) GlO.
Color and properties: White, amorphous powder.
Constants: Sp.gr. 3.016.
Soluble in acids and alkalis; insoluble in water.
Derivation: By heating glucinum nitrate.
Grades: Technical.
Containers: Glass bottles.
Uses: Glucinum salts.
Railroad shipping regulations: None.*

Glucochloral, Anhydrous. See Chloralose.

Glucose (Starch syrup; Corn syrup).
Thick, syrupy liquid, a mixture of dextrose and dextrins with water.
Color and properties: Light yellow to brown.
Soluble in water.
Derivation: By incomplete hydrolysis of starch and starchy substances by action of hydrochloric acid.
Grades: Technical; U.S.P.
Containers: 10 gal. cans; 50 gal. barrels.
Uses: Ingredient in confectionery, jelly, etc.; reducing agent; in alcoholic fermentations; adulterant in dyewood extracts; tanning; pharmaceuticals; treating tobacco.

Glue and Gelatin.

Glue.

An impure form of gelatin being a typical organic nitrogenous colloidal substance of the protein class, derived by hydrolysis (application of water and heat) from the white fibers of connective tissues of the animal body (chemically known as collagen), especially the white connective tissue of the corium or the skin, the ossein of bone and the tendons. It absorbs cold water with much swelling and dissolves in hot water, the solution solidifying to jelly on cooling. Glue is in fact impure gelatin, and any glue possessing suitable strength and appearance may be termed gelatin. Gelatin is odorless and tasteless. Sp.gr. in the dry condition is 1.35.

Fish glue is obtained by heating with water the heads, fins and tails of fish. It has weak jellying properties and is generally made into liquid glue. *Liquid glue* is made by treating fish or common glue with acetic, nitric or hydrochloric acids. The property of gelatinizing is lost by this operation but the adhesiveness is more or less unchanged. *Vegetable glue* is a yellow, thick, semi-liquid mass made by treatment of starch with caustic soda, with heat and stirring. Agar-agar is sometimes erroneously called vegetable glue. A partly decayed glutin obtained from flour in starch making is sometimes called *albumin glue*. *Bone glue* is an animal glue made wholly from bones. *Skin (hide) glue* is made from hides, kips, skins and their clippings. *Carpenter's glue* is usually a skin or bone glue. *Fining glue* is a bone glue. *Glazing glue* is a pure skin glue. *Parchment glue* is a pure skin glue. *Casein glue* is an adhesive made by dispersing casein in alkaline solutions. There are many formulas and many kinds of casein. It can be used cold. *Chrome glue* is an insoluble product prepared by mixing glue with ammonium or potassium bichromate or with chrome alum. It is used as a glass cement and for water proofing materials. *Glycerol (flexible; elastic) glue* is glue dissolved in glycerol. A glue prepared by heating glue and raw linseed oil in proportions of 1:8, followed by stirring in 2 parts of quicklime is stated to be fireproof. *Hatter's (Paris) glue* is usually the dark brown soft varieties. *Russian* or *opaque glue* is a high quality skin glue to which chalk, or white lead, or zinc oxide, or lithopone, or titanium oxide has been added to render it opaque. *Isinglass ichthyocolla* is a pure white, odorless, tasteless gelatin prepared from the inner skins of the swimming bladders of fish, usually the sturgeon. Mica is often erroneously called isinglass.

Glue appears in commerce in a wide variety of forms and colors, some of which are commonly, but erroneously, believed to be criteria of quality. The colors range through all shades of white, brown and yellow, and it may be transparent, translucent, or opaque.

In European countries glue is usually marketed in the form of oblong cakes about 3 x 6 inches (Cologne shape) or in sheets about 10 inches square (French glue). "Scotch" glue comes in very thick cakes, about 6 x 10 inches, with a string through one end. In America the bulk of the glue is used in ground form, though considerable is sold in thin, broken flakes, and some is made in the form of "noodles" or "ribbons," which special forms have no advantage other than a higher cost. Powdered glue is also used, principally in mixing with whiting to make calsomine. For eastern countries there is made a form known as "bazaar glue," which consists of a poor quality of glue in square sticks about 8 inches long and 1 inch in section.

Gelatin.

A typical organic nitrogenous colloidal substance of the protein class, derived by hydrolysis (application of water and heat) from the white fibers of connective tissues of the animal body (chemically known as collagen), especially the white connective tissue of the corium or true skin, the ossein of bone and the tendons. Its production differs from that of glue in that the raw materials are selected, cleaned and treated with especial care so that the resulting product is cleaner, purer and generally clearer and lighter in color than glue.

Three classes of gelatin are on the market, edible, photographic and technical:

Edible (Food gelatins). These must be made from clean materials, under clean conditions, and free from objectionable color, odor, bacteria and injurious substances of all kinds. Sulfur dioxide, arsenic, copper and zinc are the impurities most often tested for. Owing to refinement of analysis and the practical impossibility of eliminating all traces of metals, the following permissible limits have been tentatively fixed by the United States Department of Agriculture (Bureau of Chemistry and Animal Industry):

Arsenic	1.4 parts per million
Copper	30.0 parts per million
Zinc	100.0 parts per million

No definite figure for sulfur dioxide has been announced, although excessive amounts are considered obnoxious. The quantity is not supposed to exceed 350 parts per million, this figure being to cover the errors in analysis.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Photographic These gelatins possess high jelly strength (200 to 225 grams); pH value 5 to 6, the generally allowable limits being 4 to 7; moisture 8 to 15%; 2 to 3% ash, 2% safest; iron and copper should not exceed 50 to 60 parts per million, lead not over 50 parts per million; alumina not more than 0.2% of the weight of the dry gelatin, sulfur dioxide not more than 0.1%.

Technical. Any non-edible glue or gelatin with a color light enough and a jelly strength high enough for the use intended, may be called a technical gelatin. Usually the jelly strength is high and the color light.

Uses: Adhesive (wood joints, veneers, paper boxes, sealing paper packages, leather goods, leather belting, bookbinding, gummed cloth and tape, pyrotechnics, abrasives); sizing or stiffening (paper, hats, textiles, barrels, cheap furniture, reed furniture, baby carriages, brooms, walls); leather dressings; calsomines; colloidal protector or colloidizer (electrolytic refining of metals and electroplating, preparation of colloidal precipitates and emulsions, stabilizing fire foam, inhibiting crystallization, photography); ingredient of compositions (matches, doll's heads, printers' rollers, gas tubing, spangles, hectographs, microphotographic mounts, gelatin foils, bottle caps, picture frame moldings, room moldings, plaster casts); miscellaneous (gelatin printing, glass frosting, rubber tires, artificial fruits and flowers, pharmacy, bacteriology).

Railroad shipping regulations: None.*

Glue, Animal. See Glue and gelatin.

Glue, Fish. See Glue and gelatin.

Glusimide. See Saccharin.

Glutaric Acid (Normal pyrotartaric acid) $COOH(CH_2)_3COOH$.
Color and properties: Colorless crystals.
Constants: M.p. 97°C.; b.p. 302° to 304°C.
Soluble in water and in alcohol.
Derivation: From oxyglutaric acid by heating with hydriodic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Glutin.
Color and properties: Amorphous odorless, tasteless protein, having great adhesive strength.
Soluble in hot water.
Derivation: A constituent of glue.

Glutoform. See Glutol.

Glutol (Glutoform; Formaldehyde gelatin).
Color and properties: A hard, clear transparent mass which may be pulverized.
Derivation: By the action of a solution of formaldehyde upon gelatin.
Uses: Medicine (non-irritating and non-toxic antiseptic).

Glycerin. See Glycerol.

Glycerinocarbolic Acid. See Glycerocarbolic acid.

Glycerinophosphoric Acid. See Glycerophosphoric acid.

Glycerinum Aluminis. Glycerol of alum. Powdered alum dissolved in glycerol, used as an astringent.

Glycerinum Pepsini. Glycerol of pepsin. A solution of pepsin in hydrochloric acid and glycerol.

Glycerinum Plumbi Subacetis (Glycerol of lead subacetate). A solution of lead subacetate in glycerol, used as a sedative, astringent.

Glycerinum Tragacanthae (Glycerol of tragacanth). Tragacanth in glycerol, used as an excipient in pills.

Glycerites. Solutions of medicinal substances in glycerol.

Glycerocarbolic Acid (Glycerinocarbolic acid) $C_3H_5(OH)_2C_6H_5O$.
Color and properties: Colorless liquid.
Soluble in water and alcohol.
Derivation: By heating glycerol and phenol.
Method of purification: Distillation.
Grades: Technical.
Containers: Glass bottles; carboys.
Uses: Antiseptic; disinfectant.
Railroad shipping regulations: None.*

Glycerol (Glycerin; Glycyl alcohol; Propenyl alcohol) $C_3H_5(OH)_3$.
Color and properties: Clear, colorless, or pale yellow, odorless, syrupy liquid; sweet, warm taste.
Constants: Sp.gr. (anhydrous) 1.2653; (U.S.P.) 1.2522; (dynamite) 1.2620; m.p. 17°C.; b.p. 290°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: From the spent lye liquor from the saponification of fats and oils in the soap industry, by precipitation of salt, albuminoids and metallic soaps of the higher fatty acids by iron persulfate (crude) or aluminum sulfate and concentration with subsequent steam distillation.
Method of purification: Redistillation.
Grades: U.S.P.; C.P. (for pharmaceutical and commercial purposes where highest grade of glycerol is required); yellow distilled (for commercial purposes where color and extreme purity are not factors); distilled radiator glycerol (of the proper sp.gr. for anti-freeze in automobile radiators); high gravity or dynamite.
Containers: C.P. and U.S.P.: 1, 5, 10 lb. bottles; 10, 50 lb. tins (10 tins to case); 550, 1,100 lb. drums. Yellow distilled: 550, 1,100 lb. drums. Distilled radiator glycerol: 3, 30, 55 gal. drums. High gravity or dynamite: 550, 1,100 lb. drums.
Uses: Explosives; medicine; pharmacy; perfumery; cosmetics; foodstuffs (preservative, sweetening); flavoring tobacco; liqueurs; sugar substitute; solvent; printers' ink rolls; confectionery; rubber stamp and copying inks; binder for cements; antifreeze; leather finishing; lubricating interiors of molds; treating cork stoppers to prevent molding; shoe polishes; clay modeling; softener for artists' colors; paper (waterproofed papers, parchment papers, marbled and surface-coated papers); photography; rubber substitutes; toilet soaps; liquid soaps; textiles (solvent for certain coal-tar dyes, bleaching processes, size, printing); felt.
Railroad shipping regulations: None.*

Glycerol, Mineral. Liquid petrolatum (q.v.).

Glycerol of Borax. Borax dissolved in glycerol, used for sore mouth in children.

Glycerophosphoric Acid (Glycerinophosphoric acid) $C_3H_5(OH)_2H_2PO_4$.
Color and properties: Colorless or pale yellow liquid.
Constants: Sp.gr. 1.125.
Soluble in water and alcohol.
Derivation: By the interaction of glycerol and phosphoric acid.
Method of purification: Distillation.
Grades: Technical.
Containers: 1 oz., 1 lb. bottles; carboys.
Uses: Medicine; manufacture of glycerophosphates.
Railroad shipping regulations: None.*

Glyceryl Acetate. See Acetin.

Glyceryl Dichlorohydrin. See Dichlorohydrin, alpha-.

Glycerylborates. See Boroglycerides.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Glycerylphenyl Ether. See Antodyne.

Glyceryl Stearic Ester. See Stearin.

Glycerytannic Acid (Glycerol of tannic acid). Tannic acid and sodium citrate dissolved in glycerol, a method of preparing a stable solution of tannic acid for pharmacal use.

Glyceryl Trinitrate. See Nitroglycerin.

Glycine. The extreme dilution of methyl-para-tolyl ketone gives a perfume resembling the odor of the climbing plant Glycine (Wistaria sinensis), native to China and cultivated elsewhere. The name is also given to bouquets made from violet, lilac and jasmin ottos. Not to be confused with the glycine (q.v.) which is aminoacetic acid.
This name is also applied to hydroxyphenyl glycine, para- (q.v.).

Glycobrom. The glycerol ester of dibromocinnamic acid. Used in medicine as a sedative. Unofficial.

Glycocaine. See Diethylglycocoll-para-amino-orthooxybenzoic methyl ester hydrochloride.

Glycocholic Acid (Cholic acid) $C_{26}H_{43}NO_6$.
Color and properties: White, amorphous powder; solution has bitter-sweet taste.
Constants: M.p. 133°C.; b.p. 140°C.
Soluble in water and alcohol.
Derivation: Obtained from ox gall.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Antiseptic.
Railroad shipping regulations: None.*

Glycocoll. See Aminoacetic acid.

Glycol. See Ethylene glycol.

Glycol Alcohol. See Ethylene glycol.

Glycol Diacetate $C_2H_4(CO_2CH_3)_2$.
Color and properties: Colorless liquid, faint odor.
Constants: Sp.gr. 1.128; b.p. 186°C.
Soluble in alcohol, ether, benzene; slightly soluble in water (10%).
Derivation: (1) Ethylene glycol and acetic acid. (2) Ethylene dichloride and sodium acetate.
Methods of purification: By distillation.
Grades: Refined.
Containers: Glass bottles; steel drums.
Uses: Solvent for essential oils, cellulose esters, explosives.
Railroad shipping regulations: None.*

Glycol Salicylate (Glysal; Spirosal) $C_6H_4OHCOO(CH_2CH_2OH)$.
Color and properties: Colorless, oily liquid.
Constants: B.p. 169° to 170°C. (12 mm.).
Soluble in alcohol, ether, chloroform, benzene, olive oil; less soluble in water.
Uses: Medicine (means of administering salicylic acid endermically, antirheumatic, unofficial).
Railroad shipping regulations: None.*

Glycolic Acid (Glycollic acid; Oxyacetic acid; Hydroxyacetic acid) $CH_2OHCOOH$.
Color and properties: Colorless crystals.
Constants: M.p. 78° to 79°C.
Soluble in water, alcohol and ether.
Derivation: From chloroacetic acid by boiling with water.
Method of purification: Crystallization.
Grades: Technical.
Containers: Kegs.
Uses: Starting point in manufacture of the menthol and quinine esters of glycolic acid; dyeing cotton fabrics with aniline black; substitute for tartaric acid in the printing of cotton fabrics.
Railroad shipping regulations: None.*

Glycolin. See Petrolatum, liquid.

Glycollic Acid. See Glycolic acid.

Glycophenol. See Saccharin.

Glycopon. Registered trade name for a group of compounds which are polyalkyl glycols, ethers, or their condensation products and synthetic resins which are condensation products of these glycols and ethers with various organic acids. They are widely used in the beverage and food industries and in the manufacture of toilet preparations, plastics, paints, inks, sizes, etc., as solvents for organic and inorganic compounds, emulsifiers, detergents, thickening agents, foam producers, etc.

Glycosal (Salicylic glycerinester) $C_6H_4OHCOOC_3H_5(OH)_2$.
Color and properties: White crystalline powder, decomposed by alkalis, alkali carbonates, intestinal juices.
Constants: M.p. 71°C.
Soluble in cold water, more so in hot water, alcohol.
Uses: Medicine (antirheumatic, unofficial).
Railroad shipping regulations: None.*

Glycosine. See Saccharin.

Glycyl Alcohol. See Glycerol.

Glycyrrhiza (Licorice)
Color and properties: Glossy black flattened, cylindrical rolls or in masses. Characteristic sweet taste. Yields a brown powder when pulverized.
Habitat: United States, southern Europe to central Asia.
Derivation: The evaporated extract of Glycyrrhiza glabra or glandulifera.
Grades: Technical; U.S.P.
Uses: Medicine; flavoring tobacco and candy.
Railroad shipping regulations: None.*

Glyptal Resins. A series of synthetic resins (q.v.) produced by the action of organic acids on glycerol. They are used, principally, as a bonding agent for smooth surfaces such as glass, porcelain, mica, etc. When colored they may be used for penholders, pencils, cigarette holders, beads and the like.

Glysal. See Glycol salicylate.

Goa Powder, Purified. See Chrysarobin.

Goat's Rue. See Galega.

Goethite FeO(OH).
Yellow, red or brown mineral. Luster, adamantine to dull. Contains 62.9% of iron. Commercially classed with limonite (q.v.) under the name of brown hematite.
Constants: Sp.gr. 4 to 4.4; hardness 5 to 5.5.
Occurrence: United States (Minnesota).
Uses: Source of iron.

Gold (Au).
Color and properties: Yellow, ductile metal.
Constants: Sp.gr. 19.2; m.p. 1,062°C.; b.p. 2,530°C.
Soluble in aqua regia; insoluble in acids.
Derivation: Generally found native enclosed in quartz with iron pyrite and other minerals, or as gold telluride and recovered by amalgamation with mercury or solution in cyanide (sodium or potassium), followed by precipitation and fusion. See also Amalgam, Calaverite, Electrum, Krennerite, Nagyagite, Petzite, Sylvanite. Gold is found all over the world, but the great producing centers today are Alaska (Klondike), California, South Africa, Colorado, British Columbia, Australasia, Canada, India, China, Russia and Mexico.
Forms available: Sheet, wire, tubing, granulated, leaf, foil.
Containers: Canvas sacks; wooden boxes.
Uses: Coins; jewelry; gold salts; dentistry; amalgams; gilding; decoration; gold leaf; gold plating; laboratory ware; anodes; alloys; solders.
Railroad shipping regulations: None.*

Gold, Artificial. See Stannic sulfide.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Gold Beater's Skin. A thin, light, tough skin used by gold beaters. It consists of the outer membrane of the blind gut of the ox. Used also in lighter-than-air craft for lining the gas cells as it is practically impermeable to hydrogen and helium.

Gold, Blue. An alloy used by jewelers. It contains about 75% gold and 25% iron.

Gold Chloride

(a) $AuCl_3$. (b) $AuCl_3.2H_2O$.

Color and properties: Yellow crystals.

Soluble in water, alcohol and ether.

Derivation: By decomposing chloroauric acid with heat.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Photography; gold plating; special inks; medicine; ceramics (enamels, gilding and painting porcelain); glass (gilding, ruby glass); manufacture of finely divided gold; manufacture of purple of Cassius.

Railroad shipping regulations: None.*

Gold, Colloidal. See Collaurin.

Gold Leaf. Thin plates of gold that have been placed between layers of gold-beater's skin and hammered until they have spread to a state of extreme fineness. Gold leaf is used for gilding works of art, fabrics, books, etc. See also Dutch metal.

Gold, Liquid. A gold-colored paint composed of about 10% gold chloride, bismuth, resin and lavender oil.

Gold-potassium Chloride (Potassium aurichloride) $AuCl_3.KCl.2H_2O$.

Color and properties: Yellow crystals.

Soluble in water, alcohol and ether.

Derivation: By neutralizing chloroauric acid with potassium carbonate.

Grades: Technical.

Containers: Glass bottles.

Uses: Photography; painting porcelain and glass; medicine.

Railroad shipping regulations: None.*

Gold-potassium Cyanide (Potassium cyanaurate) $KAu(CN)_2$.

Color and properties: White, crystalline powder; poisonous!

Soluble in water; slightly soluble in alcohol; insoluble in ether.

Derivation: By the action of hydrocyanic acid on potassium aurate.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine; electrogilding.

Railroad shipping regulations: None.*

Gold Size. A mixture of 2 parts copal varnish, 1 part yellow ocher, 4 parts turpentine, and 8 parts boiled oil.

Gold-sodium Chloride $NaAuCl_4.2H_2O$.

Color and properties: Yellow crystals.

Soluble in water and alcohol.

Derivation: By neutralizing chloroauric acid with sodium carbonate.

Method of purification: Crystallization.

Containers: Glass bottles.

Grades: Technical.

Uses: Photography; staining fine glass; decorating porcelain; medicine.

Railroad shipping regulations: None.*

Gold Solder. A solder usually composed of gold, silver, copper, zinc or brass and used principally by jewelers.

Gold Tellurides. See Nagyagite, Petzite, Krennerite, Sylvanite, Calaverite.

Gold Thread. See Coptis.

Gold-tin Precipitate. See Gold-tin purple.

Gold-tin Purple (Purple of Cassius; Gold-tin precipitate).

Color and properties: Brown powder.

Soluble in ammonia.

Derivation: By the reaction of a neutral solution of gold chloride with stannous and stannic chlorides, yielding a mixture of gold chloride and tin oxide in varying proportions.

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Manufacture of ruby glass; coloring enamels; painting porcelain.

Railroad shipping regulations: None.*

Gold, White. A jeweler's alloy consisting of about 75 to 85% gold, 8 to 10% nickel and 2 to 9% zinc.

Goldbloom. See Calendula.

Golden Seal. See Hydrastis.

Goldenthread. See Coptis.

Goldfieldite $5Cu_2S.(Sb,As,Bi)_2(S,Te)_3$.

Dark lead-gray mineral. A natural sulfantimonide of copper in which part of the antimony is replaced by arsenic and bismuth and part of the sulfur by tellurium. One of the tetrahedrite group (q.v.).

Constants: Hardness 3 to 3.5.

Occurrence: United States (Nevada).

Gomme-gutte. See Gamboge.

Gommeline. See Dextrin.

Gondang Wax. See Fig-tree wax.

Goosefoot Oil. See Wormseed oil, American.

Goslarite (Zinc vitriol) $ZnSO_4.7H_2O$.

White or yellowish earthy mineral formed by the oxidation of sphalerite in damp locations, especially in the presence of iron sulfides. See also Zinc sulfate.

Gossypium. Cotton.

Gossypium Bark (Cotton-root bark).

Derivation: Dried bark of the root of Gossypium herbaceum and other cultivated species of Gossypium.

Habitat: India, China, Arabia, Egypt, West Indies, Spain, Australia, South America and United States.

Grades: Technical; U.S.P.

Containers: Boxes.

Uses: Medicine (similar to ergot but weaker).

Railroad shipping regulations: None.*

Gossypium Purificatum. Purified cotton; absorbent.

Gossypose. See Raffinose.

Goulard's Extract. A 25% solution of lead subacetate.

Gourd Oil. See Cucumber oil.

Grahamite.

An asphaltite (q.v.) resembling albertite (q.v.) in its jet-black luster. It varies in its physical properties, some deposits being fairly pure while others contains as high as 50% mineral matter.

Color and properties: Black in mass; conchoidal to hackly fracture; very bright to dull luster; black streak.

Constants: Sp.gr. (77°F.) pure varieties containing less than 10% mineral matter 1.15 to 1.20, impure varieties containing more than 10% mineral matter 1.175 to 1.50; hardness (Moh's scale) 2 to 3; penetration (77°F.) 0; fusing point (K & S) 350° to 600°F., (B & R) 370° to 620°F.; behavior on heating in flame, variety showing conchoidal fracture decrepitates violently, variety showing hackly fracture softens, splits and burns; mineral matter variable up to 50%.

Soluble in carbon bisulfide (45 to 100%).

Occurrence: United States (Colorado, Oklahoma, West Virginia), Mexico, Trinidad, Cuba.

Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grain Alcohol. See Ethyl alcohol.

Grain Oil. See Fusel oil.

Grains of Kermes. See Kermes.

Grains of Paradise. See Amomum melegueta.

Grains of Paradise Oil (Melegueta pepper oil; Paradise-seed oil).
An essential oil having an aromatic odor similar to that of cardamom oil although not so fragrant. Distilled from the seeds of Amomum melegueta (q.v.).

Graminis (Dog grass). See Triticum.

Graminis Citrati Oil. See Lemon-grass oil.

Grana Tilli. See Tiglium.

Granatum (Pomegranate bark).
Derivation: Bark of stem and root of Punica granatum.
Habitat: Mediterranean region and eastern, western and southern Asia; cultivated in semitropical countries.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (vermifuge).
Railroad shipping regulations: None.*

Granite. A holocrystalline granular igneous rock composed essentially of quartz and feldspar with or without muscovite, biotite or hornblend. Granites differ widely in their general appearance and character.
Uses: Building stone; paving blocks, etc.

Grape Cake. See Grape pomace.

Grape Pomace (Grape cake). The residue obtained from the pressing of grapes in order to extract the juice. It contains 1.5% ammonia and small amounts of phosphoric acid and potash. Sometimes used as a fertilizer.
Railroad shipping regulations: None.*

Grape-seed Oil (Grape-stone oil; Winestones oil; Raisin-seed oil).
Color and properties: Yellow, liquid, fixed oil; unpleasant odor; bitter taste.
Constants: Sp.gr. 0.9202 to 0.9350; solidification-point −10° to −15°C.; saponification value 178 to 180; iodine number 94 to 96.5; Maumené number 52 to 54.
Soluble in benzene, benzine and carbon bisulfide.
Derivation: From the dried, ground seeds of the grape, Vitis vinifera, by steeping in water, heating and pressing, or by extraction with a volatile solvent.
Method of purification: Decolorization with boneblack.
Grades: Technical.
Containers: Tins; iron drums.
Uses: Lubricant; fuel; illumination; food; soapmaking.
Railroad shipping regulations: None.*

Grape-stone Oil. See Grape-seed oil.

Grape Sugar. See Dextrose.

Graphite (Black lead; Plumbago; Mineral carbon). A soft, greasy, more or less impure form of native carbon. It is steel-gray to black in color with a dull to metallic luster.
Constants: Sp.gr. 2.09 to 2.25; hardness 1 to 2.
Occurrence: The best grades of commercial natural graphite are from Ceylon. It is also extensively mined in United States (New York, North Carolina, Massachusetts, Rhode Island, California), Siberia, Moravia, Styria, Bohemia, Madagascar, Korea, Canada, England, Scotland. Graphite is now also made artificially from other forms of carbon in the electric furnace. It also separates out in certain grades of iron.
Uses: Pencil manufacture; crucible retorts, foundry facings, molds; arc-light carbons; lubricants; rust-preventive paints and coatings; compounds for repairing boilers, stoves; polishing stoves; glazing explosive powders to protect them from dampness; boiler-scale preventives; electrodes for industrial electrolytic processes; electrotyping; parts of electrical machinery.
Railroad shipping regulations: None.*

Graphite, Extended. A graphite product obtained by covering flake graphite with an oxidizing agent and heating strongly until the particles become distended.

Graphite, Retort. See Carbon, gas.

Grapier Cement. See under Cements, structural, Grappier cement.

Grappier Cement. See under Cements, structural.

Grassellis. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
L.C., L.F.	A	I a
2 L.F.	B	I a
5 L.F.	A	I a
6 L.F.	A	I a
7 L.F.	A	I a
10 L.F.	B	I a

Railroad shipping regulations: High explosive.

Gravel Plant. See Epigaea.

Gravel Root. See Eupatorium purpureum.

Gray Acetate. See Calcium acetate.

Gray Antimony. See Stibnite.

Gray Copper Ore. See Tennantite and Tetrahedrite.

Gray Manganese Ore. See Manganite.

Grease. A term formerly restricted to fatty or oily matter of animal origin but now extended to include mixtures of tallow, mineral, animal, fish and vegetable oils with lime, soda, aluminum, or lead soaps, the latter greases being widely used as coarse lubricants. See also Axle grease, railroad; Carriage grease; Anti-friction compositions; Engine grease; Cup grease; Boiled grease.

Grease Paint. Usually powdered French chalk, a pigment and some unctuous substance used as a carrier. Carmine, burnt sienna and burnt umber are among the pigments used and glycerol, lard and pomade among the carriers.

Green Broom. See Scoparius.

Green Butter. See Borneo tallow.

Green Ebony.
Color and properties: Yellow dyewood.
Derivation: From the Excecaria glandulosa or Jacaranda ovalifolia, native to Jamaica and West Indies.
Uses: Formerly used to some extent as a dyewood, but is now practically not employed.

Green Hellebore. See Veratrum.

Green Lead Ore. See Pyromorphite.

Green Oil. A term given in the Scottish shale-oil industry to the once-run crude oil after chemical treatment. Also applied to anthracene (q.v.).

Green, Paris. See Copper acetoarsenite.

Green Soap. See Soap, soft.

Green Verdigris. See Copper acetate, basic.

Green Verditer. A paint pigment consisting of the hydroxycarbonate of copper. See Malachite.

Green Vitriol. See Ferrous sulfate.

Green Wood Spirits. A purified methyl alcohol (q.v.) similar to Columbian spirits (q.v.).

Greenland Spar. See Cryolite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Greenockite CdS.
A native cadmium sulfide containing 77.7% cadmium. Honey, citron or orange-yellow color; orange-yellow to brick-red streak; adamantine to resinous luster.
Constants: Sp.gr. 4.9 to 5.0; hardness 3 to 3.5.
Occurrence: United States (Pennsylvania, Missouri, Arkansas), Scotland, Bohemia.

Greensand. See Glauconite.

Greensand Marl. Sands of marl containing glauconite. See Marl.

Griess Reagent. A reagent used in analytical work for detecting nitrous acid. It consists of 0.1 gram pure white alpha-naphthylamine dissolved in 100 cc. of water to which is added a solution of 5 cc. glacial acetic acid and 1 gram sulfanilic acid in 100 cc. of water.

Griffiths' White. See Lithopone.

Grindelia (Gum plant; Tar weed).
Derivation: Dried leaves and flowering tops of various species of Grindelia.
Habitat: California, southwestern United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (expectorant).
Railroad shipping regulations: None.*

Grindstone. A tough sandstone of fine and even grain, composed almost entirely of quartz, mostly in angular grains. It must have sufficient cementing material to hold the grains together but not enough to fill the pores and cause the surface to wear smooth. The finest grindstones come from certain localities in New York, Ohio and Great Britain, but usable grindstones are also found in Colorado, Connecticut, Indiana, Massachusetts, Michigan, Missouri, Montana, South Dakota, West Virginia, Wyoming and Canada.

Grog. A term applied in the ceramic industry to various crushed refractory materials which are added to the batch to reduce lamination in plastic clays and also to reduce shrinkage on drying. Such materials crushed for this purpose are pottery, fire brick, quartz, quartzite, burned ware, saggers, kiln and boiler clinkers.

Grossularite. See Garnet.

Ground Apple. See Anthemis.

Ground Holly. See Chimaphila.

Ground Laurel. See Epigaea.

Ground-Nut. See Peanut.

Ground-nut Oil. See Peanut.

Ground Wood Pulp. See Paper pulp.

Grünlingite (Telluric bismuth) Bi_4S_3Te or $Bi(S,Te)$.
Pale steel-gray mineral with gray streak, metallic luster.
Contains 78.82% bismuth, 12.66% tellurium, 9.40% sulfur. See also Tetradymite, Josëite, Wehrlite.
Constants: Sp.gr. 7.32; hardness 1.5 to 2.
Occurrence: England.

Guacamphol (Guaiacol camphorate)
$C_8H_{14}(COOC_6H_4OCH_3)_2$.
Color and properties: Colorless, odorless, tasteless, crystalline needles. Less toxic and irritant than guaiacol.
Soluble in alcohol, ether and chloroform; insoluble in water.
Derivation: By the interaction of guaiacol and camphoric acid.
Method of purification: Crystallization.
Grades: Technical.
Uses: Medicine (phthisis, night sweats, unofficial),
Railroad shipping regulations: None.*

Guacetin. See Guaiacetin.

Guadalcazarite. See Meta-cinnabarite.

Guaethol. See Ethyl guaiacol.

Guaiac Gum. See Guaiacum.

Guaiac Resin. See Guaiacum.

Guaiac Wood (Lignum vitae).
Heartwood of the evergreen trees, Guaiacum officinale or sanctum.
Habitat: West Indies, northern South America.
Uses: Manufacture of instruments and utensils requiring a very hard and dense wood.

Guaiac-wood Oil (Champaca-wood oil).
Color and properties: A very thick and viscid oil, becoming crystalline at ordinary temperatures; very agreeable violet and tea-like odor.
Chief known constituent: Guaiol.
Constants: Sp.gr. 0.965 to 0.975; optical rotation −6° to −7°C.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the wood of an undetermined species of guaiacum from South America, where it is known as Palo balsam wood.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Perfumes.
Railroad shipping regulations: None.*

Guaiacetin (Guacetin; Sodium pyrocatechin; Sodium phenoneacetate)
$C_6H_4(OH)OCH_2COONa$.
Color and properties: White powder.
Soluble in water.
Derivation: By the action of sodium carbonate on phenoneacetate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Guaiacol (Methylcatechol; Protocatechol methyl ether) $OHC_6H_4OCH_3$.
Color and properties: Faintly yellowish, limpid, oily liquid or yellow solid; characteristic aromatic odor. Guaiacol constitutes 60 to 90% of beechwood creosote.
Constants: Sp.gr. 1.1395; m.p. 27.9°C.; b.p. 205°C.
Soluble in alcohol, ether, chloroform and glacial acetic acid; moderately soluble in water.
Derivation: By shaking beechwood creosote with ammonia, treating with alcoholic potash, washing with ether, crystallizing the potash compound from alcohol and decomposing it with dilute sulfuric acid.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: 1 oz. vials; ¼, 1, 5, 10 lb. bottles; 25 lb. tins.
Uses: Medicine (local irritant, germicide); preparation of catechol. Many compounds of guaiacol are on the market.
Railroad shipping regulations: None.*

Guaiacol Acetate. See Eucol.

Guaiacol Cacodylate. See Cacodyliacol.

Guaiacol Camphorate. See Guacamphol.

Guaiacol Carbonate (Duotal; Neutral guaiacol carbonate; Guaiacol ester of carbonic acid)
$(C_7H_7O)_2CO_3$.
Color and properties: Small colorless crystals or white crystalline powder. Either slight aromatic odor and taste or odorless and tasteless.
Constants: M.p. 85° to 88°C.
Soluble in chloroform, ether; less soluble in alcohol; insoluble in water.
Derivation: (a) Reaction between sodium guaiacolate and carbonyl chloride. (b) Reaction between guaiacol and methyl chloroformate.
Grades: U.S.P.
Containers: 1 lb. cartons.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Medicine (tasteless, unirritating substitute for guaiacol, unofficial).
Railroad shipping regulations: None.*

Guaiacol Carbonate, Neutral. See Guaiacol carbonate.

Guaiacol Cinnamate. See Styracol.

Guaiacol Ester of Carbonic Acid. See Guaiacol carbonate.

Guaiacol Glyceryl Ester (Guajamar; Guaiamar) $CH_3OC_6H_4OCH_2CHOHCH_2OH$.
Color and properties: White crystalline powder, bitter, aromatic taste. Less toxic and irritant than guaiacol.
Constants: M.p. 75°C.
Soluble in alcohol, ether, glycerol, water.
Uses: Medicine (intestinal antiseptic, typhoid fever, diarrhea, acute and articular rheumatism, unofficial).
Railroad shipping regulations: None.*

Guaiacol Salicylate. See Guaiacol-salol.

Guaiacol-salol (Guaiacol salicylate) $C_6H_4OCH_3C_7H_5O_3$.
Color and properties: White crystals.
Constants: M.p. 65°C.
Soluble in alcohol; insoluble in water.
Derivation: By the interaction of guaiacol and salicylic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Guaiacol Valeriate. See Geosote.

Guaiacum (Guaiac gum; Guaiac resin). A resin from certain West Indian trees, especially Guaiacum sanctum and G. officinale.
Soluble in alcohol, ether, acetone, chloroform and caustic soda.
Grades: Technical; U.S.P.
Containers: Kegs.
Uses: Medicine (stimulant, alterative, and purgative); varnishes.
Railroad shipping regulations: None.*

Guaiacyl (Calcium guaiacolsulfonate; Calcium orthoguaicol sulfonate) $Ca(C_6H_3OHOCH_3SO_3)_2$.
Color and properties: Bluish-gray powder; less toxic and irritant than guaiacol.
Soluble in alcohol and water.
Derivation: By the interaction of calcium hydroxide and guaiacolsulfonic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (guaiacol substitute, local anesthetic, unofficial).
Railroad shipping regulations: None.*

Guaiaform. See Methylene diguaiacol.

Guaiamar. See Guaiacol glyceryl ester.

Guaiasanol. See Diethylglycocollguaiacol hydrochloride.

Guajamar. See Guaiacol glyceryl ester.

Guajava. See Guava.

Guanicaine. See Di-para-anisyl-para-phenetylguanidine hydrochloride.

Guanidine (Iminourea) $NHC(NH_2)_2$.
Color and properties: Colorless crystals.
Soluble in water and alcohol.
Derivation: (a) By heating calcium cyanamide with ammonium iodide. (b) By heating thiourea with ammonium thiocyanite. (c) By the action of aqua regia on dicyanodiamine.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Guano. A term originally limited to true guano. The significance of the term has been broadened by usage to include the following varieties:
True guano. The dried excrements, feathers and carcasses of sea fowl. Formerly obtained exclusively from certain islands off the coast of Peru and Chile. Now obtained, in addition, from other sources.

Typical analysis:

	Peru	Chile	Africa	West Indies
		Per Cent		
Moisture	23	14	18	3
Ammonia	11	6.5	8	0.50
Phosphoric acid ...	12	15	13	26

Guano is also known by the source from which obtained, thus: Ballestas g., Lobos d'Afuera g., Cantores g., Lobos de Tierra g., South Guanape g., North Guanape g., etc.
Bat Guano. The dried excrements and carcasses of bats. It is very variable in composition and is used as a fertilizer though, by many, it is not considered of much value.
Dissolved Guano. Guano treated with sulfuric acid to fix the ammonia and render the phosphate nearly all soluble in water.
Equalized Guano. Guano mixed with ammonium salts in order to provide a constant nitrogen content.
Fish Guano. Dry fish scrap (q.v.).
Flesh Guano. Meat meal (q.v.).
Fray Bentos Guano. A meat meal (q.v.) produced as a by-product during the manufacture of Liebig's extract of meat.
Phosphatic Guano. Guano which has lost almost the whole of its nitrogenous content due to leaching by rain.
Whale Guano. The residue obtained after boiling and rendering whale blubber to extract the oil. This residue is dried and ground. It contains 8 to 10% ammonia, 4 to 8% bone prosphate.
Uses: Fertilizer.
Railroad shipping regulations: None.*

Guapi Bark. See Cocillana.

Guara. A tanning material containing 43.5 to 48.4% tannins.
Derivation: The ground fruits of a species of Cesalpinia found in South and Central America.

Guarana (Brazilian cacao).
Dried paste consisting chiefly of crushed seeds of Paullinia cupana.
Habitat: Brazil.
Grades: N.F.
Containers: Tins.
Uses: Medicine (for relief of migraine and chronic diarrhea).
Railroad shipping regulations: None.*

Guaranham. See Monesia.

Guaranhem. See Monesia.

Guaranine.
An active principle obtained from Guarana, thought to be identical with caffeine.

Guava (Common guava; Bay plum; Guajava, Djamboë).
Derivation: Leaves of Psidium pyriferum.
Habitat: Tropical Asia and America.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Guaza. See Cannabis indica.

Guhr. See Diatomaceous earth.

Guhr Dynamite. See Dynamite.

Guignet's Green.
Derivation: Chrome green made by fusing potassium chromate and boric acid. The mass is

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

washed, ground and dried. The chromium borate formed is decomposed by water.
Grades: Technical.
Containers: Wooden kegs.
Uses: Paint pigment.
Railroad shipping regulations: None.*

Gujasanol. See Diethylglycocollguaiacol hydrochloride.

Gum Ammoniac. See Ammoniac.

Gum Artificial. See Dextrin.

Gum Lac. See Shellac.

Gum Plant. See Grindelia.

Gum Resin. The semi-solid to solid and usually light-colored emulsion or mixtures of true resins (q.v.) with various gums (carbohydrates), constituting the sap of certain plants and trees, partly soluble in water.

Gums. See specific gum. For example, for Gum arabic see Arabic gum.

Gumbo Clay. See under Clays.

Gummi Gutta. See Gamboge.

Gummigutt. See Gamboge.

Gummite.
An alteration of uraninite (q.v.) of doubtful composition but with 61 to 75% of UO_3. Gum-like masses of reddish-yellow to red or brownish color.
Constants: Sp.gr. 4; hardness 2.5.
Occurrence: United States (North Carolina, Texas), Bohemia.

Gun Metal. An alloy of copper with 10% tin.

Guncotton. See Nitrocellulose.

Gunpowder. A mixture of saltpeter, sulfur, and charcoal in varying proportions. A typical formula is as follows: 70 to 75% saltpeter, 10 to 14% sulfur, 14 to 16% charcoal. It is designated according to size: Mealed; superfine grain or FFG; fine grain or FG; large or coarse grain or LG; large grain for rifles RLG; mammoth.
Railroad shipping regulations: Explosive.

Gunpowder, White. A mixture of 2 parts potassium chlorate, 1 part potassium ferrocyanide and 1 part sugar.
Railroad shipping regulations: High explosive.

Gurjun Balsam.
Oleoresinous secretion from a species of Dipterocarpus tree in India and China. Similar to Copaiba.
Use: Adulterant of essential oils.
Railroad shipping regulations: None.*

Gurjun Balsam Oil (Gargan balsam oil; Gardjan balsam oil; East Indian copaiba balsam oil; Indian wood oil).
Color and properties: Yellow, somewhat viscous essential oil.
Chief known constituents: Sesquiterpenes known as gurjunenes.
Constants: Sp.gr. 0.918 to 0.930; optical rotation —35° to —130°; refractive index 1.501 to 1.505; acid value up to 1; ester value up to 8, after acetylation 6 to 10.
Solubility in alcohol: In 7 to 10 vols. of 95% alcohol (solubility not unlimited).
Derivation: By distilling the kanyin and in oils obtained from various species of genus Dipterocarpus.
Uses: Adulterant of other volatile oils.
Railroad shipping regulations: None.*

Guru. See Cola.

Guthrie's Metal. See table under Fusible metals.

Gutta, Gentzsch.
An artificial gutta-percha composed of rubber and a special variety of palm wax. Sometimes a resin is incorporated in addition to the wax.
Railroad shipping regulations: None.*

Gutta-percha (Isonandra gutta).
The purified, coagulated milky juice of various trees of the geni Palaquium and Payena found in tropical Asia and South America and the Philippines.
Color and properties: Yellowish or grayish, hard, leathery sticks.
Constants: M.p. 120°C.
Partly soluble in carbon bisulfide, chloroform, benzine and warm benzene.
Grades: Technical.
Containers: Bags.
Uses: Insulating electric wires, cables and conduits; dentistry; making impressions of medals; waterproofing; fastening incandescent electric bulbs into their sockets; machinery belting; cutlery handles.
Railroad shipping regulations: None.*

Gutta-percha Substitutes. See Gutta, gentzsch; Nigrite; Velvril; Sorel's substitute.

Gutti. See Gamboge.

Gynocardia Oil. See Chaulmoogra oil.

Gynocardic Acid. A term used to denote the acids of the oil expressed from the seeds of Gynocardia odorata. It has been erroneously considered as identical with chaulmoogra oil.
Railroad shipping regulations: None.*

Gynoval (Isobornylisovaleriate)
$(CH_3)_2CHCH_2COOC_{10}H_{17}$.
Color and properties: Colorless, neutral liquid, oily taste, peculiar aromatic odor. Does not irritate the stomach.
Constants: B.p. 132° to 138°C. (12 mm.).
Soluble in alcohol, ether; sparingly soluble in water.
Uses: Medicine (sedative, hysteria, functional neuroses, unofficial).
Railroad shipping regulations: None.*

Gypsite. See Gypsum.

Gypsophila (Levant soapwort; Spanish soapwort; Radix saponaria alba).
Derivation: Root of Gypsophila struthium.
Habitat: Mediterranean region.
Grades: Technical.
Containers: Bags.
Uses: Medicine; detergent; source of saponin.
Railroad shipping regulations: None.*

Gypsum $CaSO_4.2H_2O$.
A natural hydrous calcium sulfate containing 32.5% CaO, 46.6% SO_3, 20.9% H_2O. Color, white or colorless, sometimes tinted grayish, reddish, yellowish or brownish. White streak; pearly, silky or vitreous luster. Can be easily scratched by finger nail.
Constants: Sp.gr. 2.31 to 2.33; hardness 1.5 to 2.
Varieties:
Alabaster. Fine grained and compact.
Gypsite. In coherent mass of very small gypsum crystals or particles. Soft, earthy appearance. Contains various impurities which help to effect a slow set.
Satin Spar. Fine translucent fibrous varieties,

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

pearly, opalescent appearance. Not to be confused with the variety of calcite also called satin spar.

Selenite. Colorless, clear crystals or in broad folia.

Rock Gypsum. Dull-colored rock often with clay, calcium carbonate, silica. Softer than brucite, mica, calcite, heulandite, stilbite. Harder than talc and lacks its greasy feel. See also calcium sulfate.

Occurrence: United States (Utah, Ohio, Kentucky, New York, Iowa, Michigan, Texas, Arkansas), Canada, England, France, Sicily, Switzerland.

Uses: Principal use is the manufacture of plaster of Paris, stucco, various kinds of wall plasters and cements; fertilizers (as land plaster and in compositions); metallurgy (polishing tin plate, reduction of zinc minerals); paper (sizings, coatings, fillers); paint (filler, pigment, drier, interior and cement paints); artificial ivory; dyeing and calico printing; polishing powders; baking powders, self-raising flours; brewing; carvings.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

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H Acid. See 1-Amino-8-naphthol-3:6-disulfonic acid.

H. S. See Dichlorodiethyl sulfide.

HTH (Hypochlorite). Trade name for a new high-test calcium hypochlorite. It is a dry free-flowing powder containing 65% of available chlorine. It is stated to be exceptionally stable, readily soluble in cold water and uniform in composition.

Containers: Fiber cases (12 4 lb. cans); 112 lb. drums.

Uses: Bleaching; sterilizing; oxidizing.

Haarlem Oil (Linseed oil, sulfurated and terebinthinated; Dutch drops).

Color and properties: Brownish-red oil.

Soluble in oil of turpentine; insoluble in water.

Derivation: By mixing sulfurated linseed oil with oil of turpentine.

Grades: Technical.

Containers: Glass bottles.

Uses: Antiseptic.

Railroad shipping regulations: None.*

Haematin. See Hematin.

Haemoglobin. See Hemoglobin.

Hahnemann's Soluble Mercury. See Mercurous oxide, black.

Hair Salt. See Epsomite.

Hair Stock. The short hair from animal hides contains ammonia which is not available for plant food without treatment. Therefore, during the process of manufacturing acid phosphate the hair is subjected to the hydrofluoric acid fumes given off when the phosphate rock is treated with sulfuric acid and becomes decomposed; the sulfuric acid then unites with it, forming ammonium sulfate.

Hairstone. See Needlestone.

Halazone (Sulfondichloraminobenzoic acid, para-).

Color and properties: White crystalline powder; strong chlorine odor.

Constants: M.p. 213°C.

Soluble in glacial acetic acid, benzene; slightly soluble in water, chloroform; insoluble in petroleum ether.

Uses: In the form of tablets containing sodium carbonate (or sodium borate) and sodium chloride as a powerful water disinfectant.

Railroad shipping regulations: None.*

Halibut Oil.

Color and properties: Pale yellow to dark red liquid.

Soluble in alcohol, ether, chloroform and carbon bisulfide.

Derivation: By expressing and boiling halibut livers.

Method of purification: Filtration.

Grades: Crude, refined.

Containers: Wooden barrels.

Uses: Leather dressing.

Railroad shipping regulations: None.*

Halite (Rock salt) $NaCl$.

A natural sodium chloride found in the earth in beds varying from a few feet to over three thousand feet in thickness. Color, white or colorless, but often yellow, brown, deep blue from impurities; streak, white; vitreous luster.

Constants: Sp.gr. 2.1 to 2.6; hardness 2.5.

Occurrence: United States (Utah, California, Pennsylvania, Virginia, Michigan, Ohio, Louisiana), Russia, Italy, Poland, Spain, Transylvania, Alsace, Roumania, Germany, Peru, Switzerland, England, Austria, India, Siberia, China, Canada.

Uses: See Sodium chloride.

Halloysite. A clay found in Alabama, Georgia and Indiana. It corresponds to the formula $Al_2O_3 . 2SiO_2 . 2H_2O$ and has been used to some extent in the manufacture of refractories.

Halogens. The chemically related elements, fluorine, chlorine, bromine and iodine.

Halotrichite. A natural hydrous sulfate of iron and aluminum.

$FeSO_4 . Al_2(SO_4)_3 . 24H_2O$. Found in New Mexico.

"Halowax." A proprietary name for a chlorinated naphthalene (hexa), non-inflammable.

Hamamelis (Witch-hazel; Winter bloom; Snapping hazel; Striped alder; Tobacco wood; Wych-hazel).

Derivation: Dried leaves and bark (also twigs) of Hamamelis virginiana.

Habitat: North America (New England to Minnesota, southward to Louisiana).

Grades: Technical; N.F.

Containers: Bags.

Uses: Alcoholic extract used in medicine; pharmacy; toilet preparations.

Railroad shipping regulations: None.*

Hamburg Blue. See Iron blues.

Hamburg White. A pigment composed of 1 part white lead and 2 parts barytes.

Hammer Oils. See Steam-hammer oils.

Hard Coal. See Anthracite.

Hard Head. A term applied to the impurities obtained when tin is refined.

"Hardened" Oil. See Hydrogenated oils.

Hardwood Ashes. See Wood ashes.

Harmaline. See Fuchsine.

Harness Oils. Leather dressings. A satisfactory product is stated to be compounded of leather oil, oleic acid, yellow petrolatum, aniline, oil of myrbane, and ebonite black wax. A cylinder stock (q.v.) compounded with 5% neatsfoot oil is also stated to make a satisfactory dressing.

Railroad shipping regulations: None.*

Harrison Red. See Helio fast red.

Hartshorn. See Ammonium carbonate.

Hartshorn Oil. See Bone oil.

Hartshorn, Spirit of. An alcoholic or aqueous solution of ammonia.

Harvester Oil. A mineral oil of high fire test and viscosity compounded with graphite is stated to be suitable for this purpose.

Railroad shipping regulations: None.*

See also Castor machine oil.

Hastelloys. Alloys of the following compositions: (a) Hastelloy A contains 20% iron, 60% nickel, 20% molybdenum. It offers good resistance to all concentrations of hot and cold sulfuric and hydrochloric acids except the boiling concentrated acids, all concentrations of hot and cold acetic acid, hot and cold concentrated sodium hydroxide, all concentrations of hot and cold ammonium hydroxide and mine and sea waters. (b) Hastelloy C contains iron, molybdenum and nickel in unreported proportions. It offers similar resistance to sulfuric, hydrochloric and acetic acids but it is also resistant to hot and cold dilute nitric acid and to cold concentrated nitric acid. It is also resistant under all conditions to ammonium and sodium hydroxides, mine and sea waters, moist sulfurous atmospheres and aqueous solutions of chlorine. (c) Hastelloy D is a non-ferrous alloy containing 90% nickel, 3% copper, 1.5% aluminum and 10% silicon. It offers good resistance to all concentrations of hot and cold sulfuric acid, hydrochloric acid, acetic acid, sodium and ammonium hydroxides and to sea water, moist sulfurous atmospheres and mine waters.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Hastingsite. See Hornblend.

Hatchetin. Synonym for hatchettite (q.v.).

Hatchettine. Synonym for hatchettite (q.v.).

Hatchettite (Adipocerite; Hatchetin; Hatchettine).
Color and properties: Yellowish-white to greenish-yellow hydrocarbon classified as a mineral wax. Darkens on exposure to light.
Constants: Sp.gr. 0.892 to 0.983; m.p. 46°C.
Sparingly soluble in boiling alcohol and cold ether; decomposed by sulfuric acid.
Derivation: Found in bogs and coal beds.

Hatter's Glue. See Glue and gelatin.

Hausmannite Mn_3O_4.
Brownish-black manganese ore, chestnut-brown streak. Resembles braunite (q.v.) but differs in hardness, streak and absence of silica. Luster, submetallic. Contains Mn_2O_3 69.0%, MnO 31.0%.
Constants: Sp.gr. 4.72 to 4.85; hardness 5 to 5.5.

Haüynite $Na_2Ca(NaSO_4Al)Al_2(SiO_4)_3$.
A complex mineral of the sodalite (q.v.) group. Found in lava and in some igneous rocks. Color, yellow, red, green, various shades of blue; vitreous to greasy luster; bluish to colorless streak.
Constants: Sp.gr. 2.4 to 2.5; hardness 5.5 to 6.
Occurrence: United States (Montana), Italy, Germany.

Hawk's Eye. See Falcon's eye.

Hayo. See Coca.

Heavy Carburetted Hydrogen. See Ethylene.

Heavy Oils. Dead oils, creosote oils and medium oils. These are the oils distilled over from coal-tar between 230° and 270°C.
Railroad shipping regulations: None.*

Heavy Spar. See Barytes.

Heavy Spar, Artificial. See Blanc fixe.

Heavy White. See Barytes.

Hecdecatylic Alcohol. See Cetylic alcohol.

Hectine (Sodium benzosulfo-para-amino-phenylarsenate) $C_6H_5SO_2NHC_6H_4AsOOHONa$.
Color and properties: Colorless needles.
Soluble in water.
Uses: Medicine (syphilis, filariasis, asserted to produce temporary optic neuritis as after effects, unofficial).
Railroad shipping regulations: None.*

Hedenbergite $(CaFe)(SiO_3)_2$.
A natural iron-calcium silicate. Color, grayish-green.
Occurrence: Sweden, Norway.

Hedeoma (Pennyroyal; Squaw mint).
Dried leaves and flowering tops of the annual plant, Hedeoma pulegioides.
Habitat: United States.
Grades: Technical.
Containers: Bags.
Uses: Medicine (gently stimulating aromatic, unofficial).
Railroad shipping regulations: None.*

Hedeoma Oil (American pennyroyal oil).
Color and properties: A pale yellowish limpid liquid, essential oil; characteristic, pungent, mint-like odor and taste.
Chief constituents: Pulegone, hedeomol.
Constants: Sp.gr. 0.925 to 0.940; optical rotation +18° to +35°.
Soluble in two or more parts of 70% alcohol, ether and chloroform.
Derivation: Distilled from the leaves and tops of Hedeoma pulegioides.
Adulteration: Mineral oil, turpentine, resin oil. Detected by their difficult solubility in 70% alcohol.
Method of purification: Rectification.
Grades: Technical.
Containers: 5, 10 lb. bottles; 25, 50 lb. tins.
Uses: Medicine; insectifuge.
Railroad shipping regulations: None.*

Hedera Gum (Ivy gum).
A resinous exudation from old ivy plants growing in southern Europe and northern Africa. Used in medicine (unofficial) to relieve toothache.

Hedonal (Methylpropylcarbinolurethane) $CH_3CH_2CH_2CH(CH_3)OCONH_2$.
Color and properties: White crystalline powder, feeble aromatic odor. Solutions give powerful menthol taste.
Constants: Fusing point 76°C.
Soluble in alcohol, ether, organic solvents; sparingly soluble in cold water; more soluble in hot water.
Uses: Medicine (hypnotic, unofficial).
Railroad shipping regulations: None.*

Hegonon (Silver nitrate ammonia albumose).
Color and properties: Light brown powder. Contains approximately 7% silver.
Soluble in water.
Derivation: By the action of silver ammonium nitrate on albumose.
Uses: Medicine (astringent, antiseptic, gonorrhea, unofficial).
Railroad shipping regulations: None.*

Helcosol. See Bismuth pyrogallate.

Helenin (Inula camphor; Elecampane camphor; Alant camphor; Alant acid anhydride; Alantolactone).
Color and properties: White crystals.
Constants: M.p. 64° to 66°C.; b.p. 192°C.
Soluble in alcohol and ether.
Derivation: A stearoptene from Inula helenium.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Medicine (antiseptic; expectorant).
Railroad shipping regulations: None.*
See also Inulin.

Helenium. See Inula.

Helianthus (Sunflower).
Seeds of common sunflower, Helianthus annuus.
Habitat: Temperate zone.
Grades: Technical.
Containers: Bags.
Uses: Source of sunflower seed oil; medicine.
Railroad shipping regulations: None.*

Helichrysum (Immortelles).
Derivation: Flowers of Helichrysum arenarium.
Habitat: Europe.
Grades: Technical.
Containers: Bags.
Uses: Medicine; preservative for furs.
Railroad shipping regulations: None.*

Heliodor. See Beryl.

Helio Fast Red (Harrison red). A derivative of meta-nitro-para-toluidine used in the production of some red color lakes. Its tinctorial strength is stated to be practically ten times stronger than quicksilver vermilion (q.v.). When used in sufficient strength it is permanent, but if diluted to too great an extent the base upon which it is made masks the pigment. It is stated to have poor drying qualities.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Heliolite. See Sunstone.

Heliotropin (Piperonal; Piperonyl aldehyde) $C_6H_3(CH_2OO)COH$.
Color and properties: White, shining crystals; turns red-brown on exposure to light.
Constants: M.p. 37°C.; b.p. 263°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By the oxidation of isosafrole.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1, 2, 5 lb. bottles; 1, 2, 5, 10 lb. tins.
Uses: Medicine; perfumery (fixative-moderator).
Railroad shipping regulations: None.*

Helium He.
Color: Colorless wholly inert gas—does not combine chemically with any element.
Liquefies at: —268.82°C.
Derivation: By fractional distillation of liquid air.
Grades: Technical; highest purity.
Containers: Technical, steel cylinders; highest purity, hermetically sealed glass flasks.
Uses: Filling electric luminescent tubes; filling gas cells of lighter-than-air craft.
Railroad shipping regulations: Green gas label.

Hellebore.
Rhizome of perennial evergreen herb, Helleborus niger.
Habitat: Mountainous regions of southern Europe.
Uses: Medicine (irritant of the mucous membrane, unofficial).

Helleborein $C_{26}H_{44}O_{15}$.
Color and properties: Glucoside crystallizable in yellow prisms. Tastes both sweet and bitter. Poisonous!
Soluble in water, weak alcohol; less soluble in ether and absolute alcohol.
Derivation: From black and green hellebore.
Uses: Medicine (irritant of mucous membrane, local anesthetic in affections of the eye, unofficial).
Railroad shipping regulations: None.*

Helmet Flower. See Scutellaria.

Helmitol. See Hexamethylenetetraminemethylene citrate.

Helonias (False unicorn).
Dried rhizome and roots of Chamaelirium cuteum.
Habitat: United States.
Grades: N.F.
Uses: In medicine, of doubtful value.

Hematite, Argillaceous. See Hematite, red.

Hematite, Black. See Psilomelane.

Hematite, Brown. See Limonite.

Hematite, Micaceous. Foliated or micaceous varieties of specular iron ore. See Hematite, red.

Hematite, Red (Red iron ore) Fe_2O_3, often with SiO_2, MgO, etc., as impurities.
Color and properties: Brilliant black to blackish-red or brick-red mineral, brownish- to cherry-red streak, metallic to dull luster. Contains 70.0% iron. Found in five varieties:
Argillaceous hematite. See *Clay, ironstone.*
Specular iron ore. Brilliant black color, metallic luster.
Red hematite. Blackish- to brownish-red color, submetallic.
Red ocher. Red, earthy, impure hematite. Usually with clay when it is known prior to treatment as reddle, ruddle, red chalk, or red iron froth. Also see Ocher.
Clay ironstone (Argillaceous hematite). Brownish-black to reddish-brown color, often in part deep red. Submetallic to non-metallic luster. Usually with clay, sand or other impurities.
Constants: Sp.gr. 4.9 to 5.3; hardness 5.5 to 6.5.
Occurrence: United States (Michigan, Wisconsin, Minnesota, Alabama and other states), England, France, Switzerland, Sweden, Hungary, Germany, Brazil, Canada.
Uses: The most important iron ore; pigment (red paints); rouge.

Hematoidin. See Bilirubin.

Hematoxyl. See Logwood.

Hematoxylin $C_{16}H_{14}O_6 . 3H_2O$.
Color and properties: Colorless to yellowish crystals.
Constants: M.p. 140°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: From the heartwood of Hematoxylon campechianum.
Grades: Technical.
Containers: Glass bottles.
Uses: Coloring agent.

Hemlock (Conium).
Bark of the hemlock fir, Pinus canadensis.
Habitat: Northern and western parts of the United States and Canada.
Grades: 25% tannin.
Containers: Extract: 500 lb. wooden barrels; tank cars.
Uses: Tanning industry; boiler compounds; pharmaceutical preparations.
Railroad shipping regulations: None.*

Hemlock Gum. Incorrect name for hemlock pitch or Canada pitch (q.v.).

Hemlock needle Oil. See Hemlock oil.

Hemlock Oil (Hemlock needle oil).
Color and properties: Colorless essential oil; agreeable balsamic odor.
Chief known constituents: Pinene; bornyl acetate; unidentified sesquiterpenes.
Constants: Sp.gr. 0.907 to 0.913 at 15°C.; optical rotation —20° 54′ to —23° 55′.
Derivation: Distilled from the leaves and twigs of Tsuga canadensis.
Uses: Medicine.
Railroad shipping regulations: None.*

Hemlock Pitch. See Canada pitch.

Hemoglobin. A constituent of venous blood—a conjugated protein consisting of globin, a protein in combination with hematin, a coloring material. Readily crystallized.

Hemp, Canadian. See Apocynum.

Hemp Oil. See Hemp-seed oil.

Hemp-seed Oil (Hemp oil).
Color and properties: Light green, fixed, non-drying liquid; becomes brownish-yellow on standing.
Constants: Sp.gr. 0.9255 to 0.9280; saponification value 172 to 192; Maumené number 97; iodine number 148.
Soluble in ether, benzene and carbon bisulfide.
Derivation: From hemp-seed, Cannabis sativa, by pressing or extraction.
Grades: Technical.
Containers: Tins; iron drums.
Uses: Illumination; soft soap; paints; varnishes.
Railroad shipping regulations: None.*

Henbane. See Hyoscyamus.

Henna (Egyptian privet; Lawsonia alba; Flower of paradise).
Derivation: Leaves of Lawsonia alba.
Habitat: Orient; Mediterranean region; southern Asia and Australia.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Bags.
Uses: Medicine; hair dye.
Railroad shipping regulations: None.*

Hepar Antimony. Potassium-antimony sulfide or Sodium-antimony sulfide.

Hepar Calcis. See Calcium sulfide.

Hepar Sulfuris. See Potassium sulfide.

Hepatica. See Liverwort.

Heptaldehyde. See Oenanthol.

Heptanal. See Oenanthol.

Heptane (Heptyl hydride; Methyl hexane; Normal heptane; Dipropylmethane)
$CH_3(CH_2)_5CH_3$.
Color and properties: Volatile, colorless liquid; highly inflammable.
Constants: Sp.gr. 0.694; b.p. 95° to 98°C.
Soluble in alcohol, ether and chloroform; insoluble in water.
Derivation: (a) By fractional distillation of petroleum. (b) From the oleoresin of Pinus sabiniana.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; tins.
Uses: Anesthetic; solvent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Heptoic Acid. See Oenanthic acid.

Heptoic Aldehyde. See Oenanthol.

Heptyl Acetate.
A liquid with fruity odor.
Uses: Preparation of fruit essences.
Railroad shipping regulations: None.*

Heptyl Formate.
A liquid with fruity odor.
Uses: Artificial fruit essences.
Railroad shipping regulations: None.*

Heptyl Heptoate.
A liquid with fruity odor.
Uses: Fruit essences.
Railroad shipping regulations: None.*

Heptyl Hydride. See Heptane.

Heptyl Valeriate.
A liquid with fruity odor.
Uses: Fruit essences.
Railroad shipping regulations: None.*

Heptylic Acid. See Oenanthic acid.

Heptylic Alcohol $CH_3(CH_2)_6OH$.
Color and properties: Colorless, fragrant liquid.
Constants: Sp.gr. 0.830; m.p. —36.5°C.; b.p. 175°C.
Soluble in water, alcohol and ether.
Derivation: From oenanthol by reduction.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Hercoal F.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class B.
Characteristic ingredient: Class Ia.
Railroad shipping regulations: High explosive.
See Explosives, permissible.

Hercogel.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class A.
Characteristic ingredient: Class 6.
Railroad shipping regulations: High explosive.
See Explosives, permissible.

Hercules Coal Powder 2.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class A.
Characteristic ingredient: Class Ia.
Railroad shipping regulations: High explosive.
See Explosives, permissible.

Hermophenyl (Sodiomercuric phenol disulfonate).
White amorphous powder, containing 40% metallic mercury.
Soluble in water.
Used in medicine (unofficial) in treatment of syphilis.

Heroin. See Diacetylmorphine.

Heroin Hydrochloride. See Diacetylmorphine hydrochloride.

Herrabol Myrrh. See Myrrh gum.

Herring Oil.
Color and properties: Pale yellow to dark red liquid.
Constants: Sp.gr. 0.9202 to 0.932; saponification value 179 to 194; iodine value 130 to 142; refractive index 1.478.
Soluble in ether, chloroform, benzine and carbon bisulfide.
Derivation: By boiling and pressing herring.
Method of purification: Filtration.
Grades: No. 1; No. 2; No. 2, brown; winter pressed.
Containers: Wooden barrels.
Uses: Soap; leather dressing; currying and finishing; lubricating special machinery.
Railroad shipping regulations: None.*

Hessite (Telluric silver).
Steel to lead-gray mineral, black streak, metallic luster. Corresponds to the formula Ag_2Te. The silver is often partly replaced by gold, grading to petzite (q.v.).
Constants: Sp.gr. 8.3 to 8.9; hardness 2.5 to 3.
Occurrence: United States (Colorado, California, Oregon, Utah), Hungary, Siberia, Chile, Mexico.

Hetocresol (Cresol cinnamate, meta-).
Color and properties: Crystalline powder.
Soluble in alcohol, ether, benzene, chloroform, glacial acetic acid; insoluble in water.
Uses: Medicine (external tuberculosis, bladder tuberculosis, fistula, scrophuloderma, unofficial).
Railroad shipping regulations: None.*

Hetralin (Hexamethylenetetramine resorcinol; Dihydroxybenzenehexamethylenetetramine)
$C_6H_6O_2C_6H_{12}N_4$.
Contains 60% hexamethylenetetramine.
Soluble in hot water; more soluble in cold water.
Uses: Medicine (urine antiseptic, unofficial).
Railroad shipping regulations: None.*

Hetroform. A condensation product of benzoic acid and formaldehyde used in medicine. Unofficial.
Railroad shipping regulations: None.*

Heulandite. See Zeolites.

Hewettite (Metahewettite)
$CaO_3 . V_2O_5 . 9H_2O$.
Earthy mineral powders from mahogany to brownish-red, the hewettite being the brighter. Contain 70.01% V_2O_5, 0.35% V_2O_3, 7.25% CaO, 21.30% H_2O.
Constants: Sp.gr. hewettite 2.554; metahewettite 2.511.
Occurrence: United States (Colorado, Utah).

Hexachlorobenzene C_6Cl_6.
Color and properties: White needles.
Constants: M.p. 229°C.; b.p. 69°C.
Soluble in benzene and boiling alcohol; insoluble in water.
Derivation: By heating hexyl iodide with iodine chloride.
Method of purification: Crystallization.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.

Containers: Glass bottles; tins.

Uses: Organic synthesis.

Railroad shipping regulations: None.*

Hexachlorobenzol. See Hexachlorobenzene.

Hexachloroethane. See Carbon trichloride.

Hexadecyl Alcohol, Normal Primary. See Cetylic alcohol.

Hexahydrophenol. See Cyclohexanol.

Hexahydropyridine. Piperidine.

Hexahydrothymol. See Menthol.

Hexal. See Hexamethylenetetramine sulfosalicylate.

Hexalet. See Hexamethylenetetramine sulfosalicylate.

Hexalin. See Cyclohexanol.

Hexamethylenamina, U.S.P. See Hexamethylenetetramine.

Hexamethylenetetramine (Methenamine; Cystamin; Ammonioformaldehyde; Cystogen; Formin; Aminoform; Urotropin; Hexamine; erroneously "Hexamethyleneamine"). $(CH_2)_6N_4$.

Color and properties: White crystalline powder.

Soluble in water and alcohol; insoluble in ether.

Sublimes at 263°C., partly decomposing.

Derivation: By the action of ammonia on formaldehyde.

Method of purification: Recrystallization.

Grades: Technical, U.S.P.

Containers: 1 lb. bottles; 5, 25 lb. cans; 100 lb. kegs; 100 lb. drums; 150 lb. barrels.

Uses: Medicine (urinary antiseptic); pharmaceuticals; rubber accelerator; mixed with sodium phenate and sodium hydroxide, as an absorbent for phosgene in military gas masks; synthetic resins. Many compounds of this substance are on the market.

Railroad shipping regulations: None.*

Hexamethylenetetramine Bromethylate (Bromalin; Bromethylformin) $(CH_2)_6N_4C_2H_5Br$.

Color and properties: Colorless scales or white powder; nearly tasteless.

Constants: Melts at 200°C. with decomposition.

Soluble in water.

Derivation: Interaction of ethyl bromide and hexamethylenetetramine.

Uses: Medicine.

Railroad shipping regulations: None.*

Hexamethylenetetramine Camphorate (Amphotropin) $[(CH_2)_6N_4]_2C_8H_{14}(COOH)_2$.

Color and properties: White crystalline powder.

Soluble in water and alcohol.

Uses: Medicine (urinary disinfectant; unofficial).

Railroad shipping regulations: None.*

Hexamethylenetetramine Methyl Dichromate. See Chromoform.

Hexamethylenetetramine Methylene Citrate (Uropurgol; Helmitol; Citramine) $C_7H_6O_7(CH_2)_6N_4$.

Color and properties: White, acidulous, odorless powder.

Soluble in water; almost insoluble in alcohol.

Uses: Medicine (venereal diseases; unofficial).

Railroad shipping regulations: None.*

Hexamethylenetetramine Quinate (Quinotropin; Urotropin quinate; Chinotropin)

Color and properties: Acid; agreeable taste.

Soluble in water.

Grades: Quinotropin I contains 73% quinic acid, 27% urotropin; Quinotropin II contains 80% quinic acid, 20% urotropin.

Uses: Medicine (aids solution of uric acid in the urine, unofficial).

Railroad shipping regulations: None.*

Hexamethylenetetramine Resorcinol. See Hetralin.

Hexamethylenetetramine Salicylate. See Saliformin.

Hexamethylenetetramine Sodium Acetate. See Cystopurin.

Hexamethylenetetramine Sulfosalicylate (Hexalet; Hexal; Sulfexet; Sulfexine) $[(CH_2)_6N_4]C_6H_3(OH)(COOH)SO_3H$.

Color and properties: White crystals; pleasant acid taste.

Soluble in water.

Uses: Medicine (astringent on mucous membrane of bladder, urine antiseptic, unofficial).

Railroad shipping regulations: None.*

Hexamethylenetetramine Sulfosalicylate, Secondary. See Neohexal.

Hexamethylenetetramine Tannin (Tannopin; Tannon) $(CH_2)_6N_4(C_{14}H_{10}O_9)_3$.

Color and properties: Light brown, odorless, tasteless powder. Contains 87 parts tannic acid, 13 parts hexamethylenetetramine.

Insoluble in alcohol, water and ether; soluble in alkinated liquids.

Uses: Medicine (intestinal astringent and antiseptic, unofficial).

Railroad shipping regulations: None.*

Hexamethylenetetramine Tetraiodide. See Siomine.

Hexamethylenetetramine Triborate. See Borovertin.

Hexamine. See Hexamethylenetetramine.

Hexane (Hexyl hydride; Caproyl hydride) C_6H_{14}.

Color and properties: Colorless, volatile liquid; faint, peculiar odor; highly inflammable.

Constants: Sp.gr. 0.660.

Soluble in alcohol and ether; insoluble in water.

Derivation: By fractional distillation from petroleum.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums.

Uses: Solvent.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label.

Hexoic Acid. See Caproic acid.

Hexyl Hydride. See Hexane.

Hexylic Acid. See Caproic acid.

Heyn's Reagent. The double chloride of copper and ammonia used as a reagent in the microanalysis of carbon steels to reveal ferrite.

Hiddenite. See Spodumene.

Hide Glue. See Glue and gelatin.

"Hi-Flash" Naphtha. See Naphtha, high-flash.

High Cranberry. See Viburnum opulus.

High-speed Steel. See Iron and steel (Ferrum).

Hinsdalite. A mineral related to alunite, but with replacements as indicated in the following formula: $2PbO.3Al_2O_3.P_2O_5.6H_2O$. Found in Colorado.

Hippuric Acid (Benzolaminoacetic acid; Benzaminoacetic acid; Benzoylglycin; Benzoylglycocoll) $CH_2NHCOC_6H_5COOH$.

Color and properties: White crystals.

Constants: Sp.gr. 1.3711; m.p. 190.2°C.; b.p.: Decomposes.

Soluble in alcohol and in hot water; slightly soluble in ether.

Derivation: By heating benzoic anhydride and glycocoll. Occurs in urine of herbivorous animals.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine; organic synthesis.

Railroad shipping regulations: None.*

Hirathiol.

Color and properties: Brownish-black syrupy liquid, empyreumatic odor.

Soluble in water, alcohol, glycerol.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: A combination of ammonium sulfones, sulfonates and sulfides in aqueous solution.
Uses: Medicine (similar to ichthyol, unofficial).
Railroad shipping regulations: None.*

Hirudo. Leeches.

Hoarhound. See Marrubium.

Hog's Bean. See Hyoscyamus.

Hog Gum (Doctor gum). A gum having the form of reddish tears derived from the Rhus metopium or the Moronobea grandiflora, habitat South America. A different gum to the Bassora gum (Hogg gum).

Hog-weed. See Scoparius.

Hogg Gum. One of the bassora gums (q.v.).

Hollow Brick Clay. See under Clays.

Holmia. See Rare earths.

Holmium Ho. One of the rare earth (q.v.) metals.

Holocaine Hydrochloride. See Diethoxyethenyldiphenylamidine hydrochloride, para-.

Homatropine $C_{16}H_{21}NO_3$.
Color and properties: White crystals; poisonous!
Constants: M.p. 95.5°C.
Slightly soluble in water.
Derivation: By evaporating a mixture of atropinemandelic acid with dilute hydrochloric acid.
Grades: U.S.P.
Containers: Vials.
Uses: Medicine (usually used in the form of the hydrobromide, hydrochloride, sulfate, etc.).
Railroad shipping regulations: None.*

Homatropine Hydrobromide
$C_{16}H_{21}NO_3Br$.
Color and properties: White crystals; poisonous!
Constants: M.p. 213.8°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: By the action of hydrobromic acid on homatropine.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: Vials.
Uses: Medicine (treatment of the eye).
Railroad shipping regulations: None.*

Homophan. See 6-Methylphenylquinoline-4-carboxylic acid.

Homoquinine $C_{20}H_{24}O_2N_2C_{19}H_{22}O_2N_2$,1,2, or $4H_2O$.
A molecular combination of quinine and cuprëine obtained from cuprea bark (Remijia pedunculata). It was at one time thought to be an entirely new alkaloid.
Railroad shipping regulations: None.*

Honduras Bark. See Cascara amarga.

Honey. A sweet syrupy liquid composed of from 33 to 40% levulose, 32 to 42% dextrose, 15 to 19% moisture, sometimes small amounts of sucrose, wax, pollen and other insoluble matters and from 5 to 11% other organic matter.
Grades: Honey is flavored by the flowers from which the nectar is gathered; white honey, derived from clover, is considered the best; other grades are: basswood, light amber, goldenrod, dark amber, buckwheat. Buckwheat honey is very dark and strongly flavored.
Uses: Food; flavoring agent; medicine.

Hoof and Horn Meals. The hoofs and horns of animals not available for more valuable purposes are slightly cooked until they become friable and are then ground to a fine powder for use as fertilizer. They run from 4 to 6% water and 15 to 17% ammonia.
Railroad shipping regulations: None.*

Hoof Oil. See Neats-foot oil.

Hop Oil, Terpeneless. Concentration is about 8 times that of the ordinary hop oil.

Hopcalite. A mixture of oxides of copper, cobalt, manganese and silver, used in gas masks as a catalyzer converting carbon monoxide to dioxide.

Hop Oil.
Color and properties: A green to brown essential oil; strong penetrating odor.
Chief known constituents: Humulene, geraniol, terpenes.
Constants: Sp.gr. 0.855 to 0.880.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the strobiles of Humulus lupulus.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Aromatizing beer and tobacco.
Railroad shipping regulations: None.*

Hops. See Humulus.

Horehound. See Marrubium.

Horn Silver. See Silver haloids, natural.

Hornblend.
A natural meta-silicate of calcium, magnesium, iron and aluminum. The term is rather loosely used being sometimes given to the monoclinic amphibole group of minerals as a whole and sometimes to the aluminous division of this group. The latter is the more usual. The color range of these aluminous silicates is from white or grayish through various shades of green to black. In general the iron content increases with the depth of color. Some typical varieties are:
Edenite. Colorless, white, gray, light green. Less than 5% oxides of iron.
Paragasite. Bluish-green and green.
Common Hornblend. Dark-brown, greenish-black and black.
Other varieties are speziaite, syntagmatite, hastingsite, soretite, koksharovite, kupfferite, kataforite, bergamaskite, kaersutite, philipstadite.
Occurrence: Paragasite: United States (Maine, New York), Finland, Austria. Hornblend: United States (Maine, Massachusetts, New York), Canada, Norway, Sweden, Finland, Italy, Bohemia. Edenite: United States (New York).

Hornstone. A form of native silica or quartz (q.v.) which is closely allied to flint (q.v.). It is, however, more brittle with more splinters on fracture.

Horse Flesh Ore. See Bornite.

Horse-heal. See Inula.

Horse Oil.
Color and properties: Yellow-brownish yellow liquid.
Soluble in chloroform, benzene and ether.
Derivation: By pressing horse fat and filtering.
Grades: Technical.
Containers: Wooden barrels.
Uses: Soap stock.
Railroad shipping regulations: None.*

Horsemint Oil (Monarda oil).
Color and properties: A yellowish-red or brownish-red essential oil; strong thyme-like odor.
Constants: Sp.gr. 0.920 to 0.936.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the herb, Monarda punctata.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Preparation of liniments.
Railroad shipping regulations: None.*

Horseradish Root. See Armoraciae radix.

Horsetail. See Equisetum.

Horseweed. See Erigeron.

Horseweed Oil. See Erigeron oil.

Huanuco Bark. See Cinchona bark, loxa.

Huber's Reagent. For free mineral acid. An aqueous solution of ammonium molybdate and potassium ferrocyanide. With the exception of boric acid and arsenic trioxide, free mineral acids afford a reddish-brown precipitate, or a turbidity with the reagent.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Hübl's Reagent.
(a) 50 grams iodine dissolved in 1 liter of 95% alcohol.
(b) 60 grams mercuric chloride dissolved in 1 liter alcohol.
(c) Make up an iodine monochloride solution from (a) and (b). Add in excess to a known weight of the fat or oil dissolved in chloroform. The excess of iodine chloride can be estimated by the potassium iodide and thiosulfate method. By running a blank test the amount of iodide absorbed can be estimated.
Uses: Determination of iodine value of oils and fats.

Hubnerite. See Wolframite.

Humic Acid. There are several known humic acids but the one usually referred to is that derived from humus (q.v.).

Humulus (Hops).
Carefully dried strobiles of Humulus lupulus.
Habitat: Europe and North America.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (aromatic bitter); brewing beer and beer substitutes.
Railroad shipping regulations: None.*

Humus. A black or brown substance formed by the decay of vegetable matter. Humus increases the soil's capacity for absorbing and retaining water, reduces its tenacity, and is the cause of a more rapid and thorough absorption of the sun's rays.

Humus, Sour. Humus which contains humic and related acids due to decomposition under excess of moisture and lack of air.

Hungarian Blistering Flies. See Cantharides.

Hurr Nuts. Myrobalans (q.v.).

Hyacinth-geranium Oil. An oil prepared by distilling geraniol over hyacinth flowers.

Hyacinthin. See Phenylacetic aldehyde.

Hyalite. See Opal.

Hyalophane. See Feldspar.

Hychlorite. A sodium hypochlorite solution containing 4.05% sodium hypochlorite and equivalent to 3.85% available chlorine.
Railroad shipping regulations: None.*

Hydracetin. See Acetylphenylhydrazine.

Hydrangea (Seven barks).
Dried rhizome and roots of Hydrangea arborescens.
Habitat: Eastern United States.
Grades: N.F.
Uses: Medicine (diuretic).

Hydrargillite. See Gibbsite.

Hydrargol (Mercuric succinimide; Hydrargyri succinimidium; Mercury imidosuccinate) $Hg[(CH_2CO)_2N]_2$.
Color and properties: White crystalline powder.
Moderately soluble in water.
Derivation: By heating together succinic acid, ammonia, carbon dioxide and mercuric oxide.
Uses: Medicine (pulmonary tuberculosis, unofficial).
Railroad shipping regulations: None(?)*

Hydrargotin (Mercurous tannate; Hydrargyri tannas) $Hg_23(C_{14}H_9O_9)OH$.
A preparation used in medicine in the treatment of syphilis. Prepared by rubbing together mercurous nitrate and tannic acid. Unofficial.
Railroad shipping regulations: None(?)*

Hydrargyri Chloridum Corrosivum, U.S.P. See Mercuric chloride.

Hydrargyri Chloridum Mite, U.S.P. See Mercurous chloride.

Hydrargyri Iodidum Flavum, U.S.P. See Mercurous iodide.

Hydrargyri Iodidum Rubrum, U.S.P. See Mercuric iodide.

Hydrargyri Nucleinas, U.S.P. See Mercurol.

Hydrargyri Oxidum Flavum, U.S.P. Mercuric oxide, yellow.

Hydrargyri Oxidum Rubrum, U.S.P. See Mercuric oxide, red.

Hydrargyri Salicylas, U.S.P. See Mercuric salicylate; also Enesol.

Hydrargyri Succinimidum. See Hydrargol.

Hydrargyri Sulphas Ethylenediaminata. See Sublamine.

Hydrargyri Tannas. See Hydrargotin.

Hydrargyrum, U.S.P. See Mercury.

Hydrargyrum Ammoniatum, U.S.P. See Ammoniated mercury.

Hydrargyrum cum Creta, U.S.P. See Mercury with chalk.

Hydrastina, U.S.P. See Hydrastine.

Hydrastinae Hydrochloridum, U.S.P. See Hydrastine hydrochloride.

Hydrastine (Hydrastina) $C_{21}H_{21}NO_6$.
Color and properties: White pulverulent poisonous alkaloid.
Constants: M.p. 131°C.
Slightly soluble in water, alcohol and ether.
Derivation: By extraction of the root of Hydrastis canadensis, with subsequent crystallization.
Grades: U.S.P.
Containers: ⅛, ¼, ½, 1 oz. vials; 5, 10, 15 grain vials.
Uses: Medicine (usually used in the form of the hydrochloride, sulfate, tartrate, etc.).
Railroad shipping regulations: None.*

Hydrastine Hydrochloride (Hydrastinae hydrochloridum) $C_{21}H_{21}NO_6.HCl$.
Color and properties: White crystals; poisonous!
Soluble in water and alcohol; slightly soluble in ether.
Derivation: By the action of hydrochloric acid on hydrastine.
Method of purification: Crystallization.
Grades: Technical; N.F.
Containers: 5, 10, 15 grain vials; ⅛, ¼, ½, 1 oz. vials.
Uses: Medicine (locally for catarrh and internally as a uterine stimulant).
Railroad shipping regulations: None.*

Hydrastinine $C_{11}H_{13}NO_3$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 116° to 117°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By extraction of the root of Hydrastis canadensis, with subsequent crystallization. The salts are obtained by the action of the respective acid on the alkaloid.
Grades: Technical; U.S.P.
Containers: 5, 10, 15 grain vials.
Uses: Medicine.
Railroad shipping regulations: None.*

Hydrastis (Golden seal; Orange root; Yellow root; Yellow puccoon; Turmeric root; Indian turmeric).
Dried rhizomes and roots of Hydrastis canadensis.
Chief constituents: Alkaloids, berberine, canadine and hydrastine.
Habitat: North America.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (source of its alkaloids).
Railroad shipping regulations: None.*

Hydrated Alumina. See Aluminum hydroxide.

Hydraulic Cement. See under Cements, structural.

Hydraulic-press Lubricating Oils. An oil of the constants given under concrete form oils (q.v.) is stated to be suitable for this purpose.

Hydrazine NH_2NH_2.
Color and properties: Colorless liquid.
Constants: Sp.gr. 1.013; m.p. 1.4°C.; b.p. 113.5°C.
Soluble in water and alcohol.
Derivation: By reduction of nitrosamine with zinc dust and acetic acid.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis; phenylhydrazine.
Railroad shipping regulations: None(?)*

Hydriodic Acid (Hydrogen iodide) HI.
Color and properties: Clear colorless or pale yellow liquid, an aqueous solution of hydrogen iodide, which is a gas at ordinary temperatures.
Constants: Sp.gr. 4.3737; m.p. −51.3°C.; b.p. −35.6°C.
Derivation: (1) In gaseous form by decomposition of phosphoric iodide with a minimum amount of water. (2) By passing hydrogen with iodine vapor over warm platinum sponge which acts as a catalyzer, and absorption in water.
Grades: Technical, strength 49°Bé. (Sp.gr. 1.5); U.S.P. (10%).
Containers: U.S.P.: ¼, 1, 5 lb. bottles; 100 lb. carboys. Technical: 150 lb. carboys.
Uses: Medicinal (alterative); preparation of iodine salts; organic preparations; analytical reagent; disinfectant; pharmaceuticals.
Railroad shipping regulations: White label.

Hydriodic Ether. See Ethyl iodide.

Hydrobenzoic Acid, Ortho-. See Salicylic acid.

Hydroberberine $C_{20}H_{21}NO_4$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 167°C.
Soluble in alcohol; insoluble in water.
Derivation: By reducing berberine with nascent hydrogen.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Hydrobromic Acid (Hydrogen bromide).
Color and properties: Clear, colorless or faintly yellow liquid consisting of an aqueous solution of hydrogen bromide, which is a gas at ordinary temperatures.
Constants: Sp.gr. (HBr gas) 2.71; m.p. −86.13°C.; b.p. −68.7°C.
Derivation: By passing hydrogen with bromine vapor over warm platinum sponge which acts as a catalyzer and absorption in water.
Impurities: Sulfuric acid, heavy metals, hydrochloric acid, hydriodic acid.
Grades: Technical, strength 40% HBr; C.P.; U.S.P.
Containers: U.S.P., Glass bottles; 100 lb. carboys. Technical, 125, 155 lb. carboys.
Uses: Medicine (nerve sedative); analytical chemistry; organic preparations.
Railroad shipping regulations: White label.

Hydrobromic Ether. See Ethyl bromide.

Hydrochinone. See Hydroquinone.

Hydrochloric Acid (Muriatic acid; Chlorohydric acid; Hydrogen chloride). HCl in aqueous solution.
Color and properties: Clear, colorless or slightly yellow, fuming, pungent liquid; poisonous!
Constants: Sp.gr. 1.194 at −85.8°C.; m.p. −111°C.; b.p. −83.1°C. One liter of gas weighs 1.6392 grams at 0°C.
Soluble in water, alcohol and ether.
Derivation: Generally made by the action of sulfuric acid on common salt. It is also obtained as a by-product of the Leblanc soda process. The salt and sulfuric acid are mixed and gently heated in an "open roaster" or in a muffle or "closed roaster." The hydrogen chloride gas generated is absorbed in water, either by passing through tall towers filled with coke over which the water trickles; or in earthenware Woulff bottles (bonbonnes), provided with safety tubes for back-pressure and with a coke tower at the end of the series. Glauber's salt, saltcake form by-products. Also made by burning hydrogen in an atmosphere of chlorine or causing hydrogen and chlorine to combine under pressure in the presence of catalysts. Also formed as a by-product in the chlorination of benzene.
Method of purification: Rectification (to remove arsenic); sometimes fractional distillation over ferrous chloride.
Impurities: Iron and arsenic.
Grades: Technical (usually 16°, 18°, 20°, or 22°Bé.); white; C.P.; U.S.P.
Containers: Glass bottles; carboys (12 gal.); rubber-lined steel or wooden tank cars (25-40 tons).
Uses: Chrome tanning; leather industry; organic synthesis; dye manufacture; dyeing; artificial silk manufacture; intermediates; bleaching of edible and technical fats and oils; metallurgy [etching, galvanizing metals, recovery of zinc from galvanized scrap, solvent for gold (with nitric acid) and silver, pickling iron for tinning purposes, electroplating, wire manufacture, purifying iron ores, metallurgy of copper and galena containing zinc]; photography; paint pigments; glue and gelatin manufacture; paper manufacture; process engraving and lithographing; purification of soap stock; textiles (bleaching, dyeing, printing, mercerizing); ink manufacture; tinning and soldering; reclaimed rubber; sugar (purification of charcoal, diffusory auxiliary in beet sugar manufacture); ceramics, glass (purification of sand and clay); analytical reagent.
Railroad shipping regulations: White label.

Hydrochloric Acid, Fuming. Hydrochloric acid of sp.gr. 1.19 containing about 37% HCl, used as a reagent.

Hydrochloric Ether. See Ethyl chloride.

Hydrocinnamic Acid.
Color and properties: Crystals with hyacinth-rose odor.
Constants: M.p. 46°C.
Derivation: Reduction of cinnamic acid with sodium amalgam.
Uses: Fixative for perfumes.
Railroad shipping regulations: None.*

Hydrocinnamic Aldehyde.
Colorless liquid; fragrant odor.
Uses: Perfumery.
Railroad shipping regulations: None.*

Hydrocotarnine $C_{12}H_{15}NO_3 . \frac{1}{2}H_2O$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 50° to 55°C.
Soluble in alcohol and ether.
Derivation: From opium.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Hydrocyanic Acid (Prussic acid; Hydrogen cyanide; Formonitrile) HCN.
Color and properties: Colorless gas (liquefies at —15°C.), appearing in commerce in aqueous solutions (generally 2% or 10%); colorless liquid; vapors intensely poisonous; odor of bitter almonds.
Constants: Sp.gr. (gas) 0.9483; m.p. (liquid anhydrous HCN) —15°C.; b.p. (liquid anhydrous HCN) 26.1°C.
Soluble in water, alcohol and ether.
Derivation: By distilling a concentrated solution of potassium cyanide with dilute sulfuric acid and absorption of the vapors in water.
Grades: Technical, strength 10% and 5%; U.S.P.; strength 2%.
Containers: Steel cylinders.
Uses: Chemical analysis; medicine (very dilute solution as cough sedative and for nervous sick stomach); insecticide (gassing citrus trees); organic synthesis; military poison gas.
Fire hazard: The gas is inflammable.*
Railroad shipping regulations: Shipped as a liquefied gas under a poison gas label. The solutions of hydrocyanic acid in water are shipped as Class B poison.

Hydrocyanic Ether. See Ethyl cyanide.

Hydrodisodium Phosphate. See Sodium phosphate, dibasic.

Hydrofluoric Acid (Hydrogen fluoride; Fluorhydric acid) HF in aqueous solution.
Color and properties: Clear, colorless, fuming, mobile corrosive liquid. Produces terrible sores when allowed to touch the skin.
Constants: Sp.gr. (gas) 0.7126; m.p. (anhydrous liquid) —92.3°C.; b.p. (anhydrous liquid) 19.44°C.
Soluble in water.
Derivation: Powdered calcium fluoride is treated with sulfuric acid and the mixture distilled in a platinum retort. The hydrofluoric acid gas passes over and is dissolved in distilled water.
Grades: Technical, strength 30%, 40%, 48%, 52%; C.P.; fuming.
Containers: 30%: 10 gal. lead carboys; 50 gal. barrels; 48%: 10 gal. lead carboys; 52%: 10 gal. lead carboys; 60%: 10 gal. lead carboys; 20, 30, 100 gal. steel drums.
Uses: Chemicals (fluorides, electrolytic manufacture of chlorates and persulfates, hydrogen peroxide from peroxide of sodium); analytical reagent; ceramics (to increase porosity); breweries and distilleries (antiseptic, retarding injurious fermentation); frosted glassware; etching glass; reagent in manufacture of filter paper; purification of beet sugar; yeast manufacture; manufacture of chemical and physical apparatus for etching divisions on thermometer stems, etc.; cleaning copper and brass; removal of sand particles in metallic castings; graphite purification.
Railroad shipping regulations: White label.

Hydrofluorsilicic Acid. See Hydrofluosilicic acid.

Hydrofluosilicic Acid (Silicofluoric acid; Hydrosilicofluoric acid; Hydrofluorsilicic acid; Sand acid) H_2SiF_6.
Color and properties: Transparent, colorless, fuming liquid. Corrosive liquid!
Soluble in water.
Derivation: When strong hydrofluoric acid acts upon sand, silicon tetrafluoride is liberated. It is generally made by heating sand with powdered calcium fluoride and sulfuric acid in excess. It is distilled as a gas and collected in distilled water. The commercial article comes largely from gases produced in phosphate manufacture.
Grades: Technical; C.P.
Containers: 10 gal. carboys; 50 gal. barrels; tank cars.
Uses: Ceramics (increasing hardness); disinfecting copper and brass vessels in breweries; in building (hardening cement, plaster of Paris, concrete flooring, preserving masonry); general disinfectant; technical paints; wood preservative and impregnating compounds.
Railroad shipping regulations: White label.

Hydrofranklinite. See Chalcophanite.

Hydrofuramide (Furfuramide) $(C_4H_3OCH)_3N_2$.
Color and properties: Light brown to white powder.
Soluble in alcohol and ether and slightly soluble in water.
Constants: M.p. 143°C.
Derivation: Treatment of furfural with ammonium hydroxide.
Grades: Technical.
Containers: Cans and drums.
Uses: Rubber accelerator; substitute for hexamethylenetetramine as hardening agent in phenol-aldehyde resins; fungicide.
Railroad shipping regulations: None.*

Hydrogen H_2.
Color and properties: Colorless gas; highly inflammable.
Constants: Sp.gr. 0.06940; m.p. —259°C.; b.p. —252°C.
Soluble in water.
Derivation: (a) By the electrolytic dissociation of water as a by-product in the manufacture of caustic alkali and electrolytic oxygen. (b) By passing a current of steam through heated iron pipes. (c) By the action of dilute sulfuric acid on iron filings. (d) By the silicol process in which a silicon alloy (ferrosilicon, manganosilicon or silico-spiegel) is allowed to act on a hot, strong solution of caustic soda. (e) By the action of water on an alloy of magnesium and lead. (f) By removal of the carbon monoxide from water gas by absorption in hot concentrated caustic alkali. (g) By passing steam over red hot iron, intermittently with a reducing agent. (h) By the hydrolith process whereby calcium hydride (90% pure, the balance being oxide and nitride) is decomposed by water. (i) By the ignition of "Hydrogenite" (a compressed powder composed of 25 parts of ferrosilicon containing 90 to 95% silicon, 60 parts sodium hydroxide, and 20 parts soda lime).
Grades: Technical; pure.
Containers: Steel cylinders.
Uses: Chemical (hydrogenation of naphthalene to produce tetralin and decalin and of phenol to produce hexalin, prussic acid manufacture, hydrochloric acid made by chlorine process, synthetic ammonia); various laboratory uses; organic preparations; oxy-hydrogen flame for welding; gas for lighter-than-air craft; oxy-hydrogen limelight; manufacture of mercury vapor arc light from fused quartz; reduction of tungstic acid to metallic tungsten; fusing tungsten powder into the form of rods; gaseous atmosphere in tungsten lamps; hydrogenation of oils; quartz glassware; synthetic rubies and sapphires; platinum working; photography.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red gas label.

Hydrogen Bromide. See Hydrobromic acid.

Hydrogen Carboxylic Acid. See Formic acid.

Hydrogen Chloride. See Hydrochloric acid.

Hydrogen Cyanide. See Hydrocyanic acid.

Hydrogen Dioxide. See Hydrogen peroxide.

Hydrogen Fluoride. See Hydrofluoric acid.

Hydrogen Iodide. See Hydriodic acid.

Hydrogen Nitrate. See Nitric acid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Hydrogen Peroxide (Hydrogen dioxide; Perhydrol; Peroxida) H_2O_2.

Color and properties: Colorless, heavy liquid, appearing in commerce in the form of an aqueous solution. Keep cool and dark. A powerful oxidizing agent.

Constants: (Anhydrous); sp.gr. 1.4584; m.p. −2°C.; b.p. 80.2°C.

Soluble in water, alcohol and ether.

Derivation: (a) By the action of dilute mineral acid, usually sulfuric, on barium peroxide. (b) By treating barium peroxide with carbon dioxide under pressure, in presence of water.

Impurities: The commercial article generally contains a little acetanilide, added to preserve the peroxide solution. Inferior brands sometimes contain free sulfuric acid.

Grades: 17 vol. (5%); 25 vol. (7.5%); 100 vol. (28-30%); C.P.; U.S.P.

Containers: U.S.P.: 1 gross cases of 4, 8, 12 or 16 oz. bottles; 5, 8 lb. bottles; 8 lb. jugs; 375 lb. barrels. C.P.: 1, 5 lb. bottles. 17 vol.: 380 lb. barrels. 25 vol.: 380 lb. barrels. 100 vol.: 120 lb. glass carboys.

Uses: Bleaching agent; oxidizing agent; antiseptic; hydrolytic agent; chemical reagent; dyes; intermediates; food preservative and bleaching agent, also used for the removal of the last traces of sulfur dioxide used in bleaching various foods; refining and bleaching oils and fats; bleaching gelatin; tanning; preservation of tannins and tanning extracts; disinfection of hides during long storage; cosmetic preparations; golden hair wash (dilute solution plus small amount of nitric acid); photography; special soaps; textiles (dyeing, bleaching and printing processes); brewing (preservative, destroying ferments in wort, sterilizing casks and filter pulp); surgery and medicine; mouth wash; dentifrices; bleaching discolored teeth; solvent for Indian gum; bleaching straw, bones, feathers, etc.; manufacture of sugar from starch; breaking down starch to obtain dextrin and products of lower molecular weight that are soluble in cold water; disinfecting drinking water; ingredients of sanitary compositions.

Railroad shipping regulations: None.*

Hydrogen Phosphide. See Phosphine.

Hydrogen, Phosphoretted. See Phosphine.

Hydrogen, Phosphuretted. See Phosphine.

Hydrogen Sulfide (Sulfuretted hydrogen) H_2S.

Color and properties: Colorless, inflammable gas; offensive odor; sweetish taste.

Constants: Sp.gr. 1.1895; m.p. −83.8°C.; b.p. −60.2°C.

Soluble in water and alcohol.

Derivation: (a) By the action of dilute sulfuric acid on a sulfide, usually iron sulfide. (b) By direct union of hydrogen and sulfur vapor at a definite temperature and pressure. (c) By heating sulfur with paraffin wax.

Containers: Usually prepared as wanted; also shipped in steel cylinders.

Uses: Purification of hydrochloric and sulfuric acids; precipitating sulfides of metals; reagent in analytical chemistry.

Railroad shipping regulations: Red gas label.

Hydrogen Tellurate. See Telluric acid.

Hydrogenated Oils ("Hardened" oils).

Oils treated with hydrogen in presence of a catalyst, thereby converting all or part of the oleic acid or olein into stearic acid or stearin. The oils thus treated are rendered suitable for human consumption, the manufacture of hard soaps (where previously they could only be used for making soft soaps), and for making lubricants. Hydrogenated oils are also used for making lard substitutes, tanner's greases, varnishes, etc.

Hydrohematite. See Turgite.

Hydrohydrastinine $C_{11}H_{13}NO_2$.

Color and properties: White crystalline alkaloid; poisonous!

Constants: M.p. 66°C.

Soluble in alcohol and ether.

Derivation: By extraction of Hydrastis canadensis, and subsequent crystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Hydrol. See Tetramethyldiaminobenzhydrol.

Hydrol, Michler's. See Tetramethyldiaminobenzhydrol.

Hydrone. Proprietary name for an alloy said to contain sodium (35%) and lead, a convenient form for handling sodium.

Hydrophane. See Opal.

Hydroquinol. See Hydroquinone.

Hydroquinone (Quinol; Hydrochinone; Hydroquinol; Para-hydroxybenzene $C_6H_4(OH)_2$.

Color and properties: White crystals.

Constants: Sp.gr. 1.330; m.p. 176°C.; b.p. 285°C.

Soluble in water, alcohol and ether.

Derivation: (a) From aniline by reduction and oxidation. (b) By reducing quinone with sulfurous acid.

Method of purification: Crystallization.

Grades: Technical; U.S.P.

Containers: Glass bottles; 100 lb. wooden barrels.

Uses: Photographic developer; dye intermediate; medicine (unofficial).

Railroad shipping regulations: None.*

Hydroquinone Hydrochloride $C_{22}H_{26}O_2N_2.HCl.2H_2O$.

Color and properties: White, crystalline, alkaloid salt.

Soluble in alcohol and water.

Derivation: Extraction from Cinchona.

Uses: Medicine (treatment of malaria and whooping cough, unofficial; raw material for manufacture of hydrocupreine.

Railroad shipping regulations: None.*

Hydrosilicofluoric Acid. See Hydrofluosilicic acid.

Hydrosulfite. This term refers to sodium hydrosulfite (q.v.).

Hydrosulfite A. A 10% solution of Hydrosulfite N.F. Used in testing dyed fabrics.

Hydrosulfite B. 200 cc. of Hydrosulfite A acidified with 1 cc. acetic acid. Used in testing dyed fabrics.

Hydrosulfite BASF. A German brand of hydrosulfite. It is a 90% sodium hydrosulfite (q.v.).

Hydrosulfite-formaldehyde Compounds.

(a) Compounds obtained by adding a solution of formaldehyde to a solution of sodium hyposulfite. They are a mixture of sodium formaldehyde-sulfoxylate and sodium formaldehyde-bisulfite. Used as discharges in calico printing. Typical brand names: Hydrosulfite NF, Rongalite C, Hyraldite C.

(b) An improvement on (a), the bisulfite being changed into the sulfoxylate compound by the action of zinc.

Typical brand names: Hydrosulfite NF conc., Hyraldite C extra, Rongalite C conc.

Railroad shipping regulations: None.*

Hydrosulfite NF. See Hydrosulfite-formaldehyde compounds.

Hydrosulfite NF Concentrated. See Hydrosulfite-formaldehyde compounds.

Hydrotan. Proprietary name for a dehairing agent.

1:2:4-Hydroxy Acid. See 1-Amino-2-naphthol-4-sulfonic acid.

Hydroxyacetic Acid. See Glycolic acid.

Hydroxyapatite. See Apatite.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Hydroxybenzene. See Phenol.

Hydrobenzoic Acid, Meta- $C_6H_4(OH)COOH.H_2O$.
Color and properties: Colorless crystals.
Constants: M.p. 210°C.
Soluble in alcohol.
Derivation: By the action of meta-aminobenzoic acid and nitrous acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes (azo); intermediates.
Railroad shipping regulations: None.*

Hydroxybenzoic Acid, Ortho-. See Salicylic acid.

Hydroxybenzoic Acid, Para- $C_6H_4(OH)COOH.H_2O$.
Color and properties: Colorless crystals.
Constants: M.p. 210°C.
Soluble in alcohol and in ether.
Derivation: By the interaction of para-aminobenzoic acid and nitrous acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Intermediates; synthetic drugs.
Railroad shipping regulations: None.*

Hydroxybenzol. See Phenol.

Hydroxybutyraldehyde, Beta-. See Aldol.

Hydroxycitronellal (Citronellal hydrate; Synthetic muguet).
Color and properties: Pale yellow, viscous oil; sweet odor.
Uses: Perfumery (fixative, muguet odor).
Railroad shipping regulations: None.*

Hydroxylamine (Oxammonium) NH_2OH. The free base is known only in solution and is unstable.
Color and properties: Colorless crystals; decomposes when heated and explodes at 130°C.
Constants: Sp.gr. 1.227; m.p. 33°C.; b.p. 70°C.
Soluble in alcohol, acids and cold water.
Derivation: By decomposing hydroxylamine hydrochloride with a base and distilling in vacuo.
Method of purification: Redistillation.
Grades: Technical; pure.
Containers: Tins; glass bottles.
Uses: Reducing agent; organic synthesis.
Railroad shipping regulations: None(?)*

Hydroxylamine Hydrochloride (Oxammonium hydrochloride) $NH_2OH_2.HCl$.
Color and properties: Colorless crystals.
Constants: M.p. 151°C.; b.p.: Decomposes.
Soluble in water and glycerol; moderately soluble in alcohol; insoluble in ether.
Derivation: By the action of hydrochloric acid on moist mercury fulminate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Organic synthesis; photographic developer; medicine (skin diseases, unofficial).
Railroad shipping regulations: None.*

Hydroxylamine Sulfate (Oxammonium sulfate) $(NH_2OH)_2.H_2SO_4$.
Color and properties: Colorless crystals; solution has a corrosive action on the skin.
Constants: M.p. 140°C.
Soluble in water, alcohol and ether.
Derivation: (a) By the electrolytic reduction of nitric acid in presence of hydrochloric acid. (b) Soda ash is added to a cooled solution of sodium nitrite and sulfur dioxide passed into the solution which must constantly be kept cooled below 0°C. The solution of disulfonic acid is decanted, concentrated, acidified if necessary and heated. It is then almost completely neutralized with sodium carbonate, allowed to stand for a time, then filtered.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Organic synthesis; dimethylglyoxime.
Railroad shipping regulations: None.*

3-Hydroxy-2-naphthoic Acid (Hydroxynaphthoic acid, beta-) $C_{10}H_6OHCOOH$.
Color and properties: Yellow rhombic leaflets.
Constants: M.p. 217.5° to 219°C.
Soluble in alcohol and ether.
Derivation: Carbonation of sodium beta-naphtholate.
Method of purification: Recrystallization from alcohol.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Hydroxynaphthoic Acid, Beta-. See 3-Hydroxy-2-naphthoic acid.

Hydroxynaphthoic Anilide, Beta- (Naphthol AS) $C_{10}H_6OHCONHC_6H_5$.
Color and properties: Cream-colored crystals.
Constants: M.p. 246.0°C.
Sodium salt is soluble in water.
Derivation: Condensation of beta-hydroxynaphthoic acid and aniline.
Method of purification: Recrystallized through sodium salt.
Grades: Technical.
Containers: Barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Hydroxyphenylglycine, Para- (Glycine) $HOC_6H_4NHCH_2COOH$.
Color and properties: Colorless leaflets.
Constants: M.p. 240°C.
Slightly soluble in water.
Derivation: By condensation of para-aminophenol with chloroacetic acid.
Method of purification: Recrystallization.
Grades: Technical; photographic.
Containers: Barrels; bottles.
Uses: Photographic developer.
Railroad shipping regulations: None.*

Hydroxypropionic Acid, Alpha-. See Lactic acid.

Hydrozincite (Zinc bloom). $ZnCO_3.2Zn(OH)_2$.
White stalactites or white to yellowish incrustation upon other zinc minerals. Dull or pearly luster. Contains 75.3% zinc oxide. Soluble in cold dilute acids. It results from alteration of other zinc ores and occurs in minor quantities in many zinc deposits.
Constants: Sp.gr. 3.58 to 3.8; hardness 2 to 2.5.
Occurrence: United States (Arkansas, Kansas, New Mexico), Spain, Algeria.

Hyminic Acid. See Solurol.

Hyoscine (Scopolamine) $C_{17}H_{21}NO_4$.
Color and properties: Thick, colorless, syrupy liquid alkaloid; poisonous!
Constants: M.p. 50° to 59°C.
Soluble in water, alcohol and ether.
Derivation: By extraction of various solanaceae, hyoscyamus, belladonna, etc.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (in form of hydrobromide U.S.P. hydrochloride, hydroiodide, sulfate, etc., as nerve sedative).
Railroad shipping regulations: None.*

Hyoscine Hydrobromide (Scopolamine hydrochloride) $C_{17}H_{21}NO_4HBr.3H_2O$.
Color and properties: White crystals; poisonous!
Constants: M.p. 191°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: By the action of hydrobromic acid on hyoscine.
Method of purification: Crystallization.
Grades: Technical; U.S.P.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: 5, 15 grain vials; glass bottles.
Uses: Medicine (nerve sedative).
Railroad shipping regulations: None.*

Hyoscine Sulfate
$(C_{17}H_{21}NO_4)_2.H_2SO_4.2H_2O$.
Color and properties: White crystals; poisonous!
Soluble in water and alcohol.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (nerve sedative).
Railroad shipping regulations: None.*

Hyoscyamine $C_{17}H_{23}O_3N$ (Isomeric with atropine).
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 108.5°C.
Derivation: By extraction of belladonna or scopola roots, and subsequent crystallization.
Uses: Medicine (in form of hydrobromide, U.S.P., hydrochloride and sulfate, as narcotic and sedative).
Railroad shipping regulations: None.*

Hyoscyamine Hydrobromide $C_{17}H_{23}NO_3.HBr$.
Color and properties: White crystals; poisonous!
Constants: M.p. 191° to 192°C.
Soluble in water, alcohol and ether.
Derivation: By the action of hydrobromic acid on hyoscyamine.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: ⅛, 1 oz. vials; 5, 10, 15 grain vials.
Uses: Medicine (narcotic and sedative).
Railroad shipping regulations: None.*

Hyoscyamine Hydrochloride $C_{17}H_{23}NO_3.HCl$.
Color and properties: White crystals; poisonous!
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on hyoscyamine.
Method of purification: Crystallization.
Grades: Technical.
Containers: ⅛, 1 oz. vials; 5, 10, 15 grain vials.
Uses: Medicine (narcotic and sedative).
Railroad shipping regulations: None.*

Hyoscyamine Sulfate
$(C_{17}H_{23}NO_3)_2.H_2SO_4$.
Color and properties: White crystals; poisonous!
Constants: M.p. 198.9°C.
Soluble in water, alcohol and ether.
Derivation: By the action of sulfuric acid on hyoscyamine.
Method of purification: Crystallization.
Grades: Technical.
Containers: ⅛, 1 oz. vials; 5, 10 15 grain vials.
Uses: Medicine (narcotic and sedative).
Railroad shipping regulations: None.*

Hyoscyamus (Henbane; Hog's bean; Insane root; Poison tobacco; Black henbane).
Dried leaves and flowering tops of Hyoscyamus niger.
Chief constituents: Alkaloids hyoscyamine and hyoscine.
Habitat: Europe, Asia and United States; cultivated in England.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (similar to belladonna); source of alkaloids.
Railroad shipping regulations: None.*

Hypericum (St. John's bread; St. John's wort).
Color and properties: Dark brown mixture of leaves, twigs, etc.
Chief constituents: Tannin, a volatile oil, a pigment.
Derivation: The whole plant, Hypericum perforatum; habitat: Europe, northern Asia, United States.
Grades: Technical.
Containers: Bags; wooden barrels.
Uses: Medicine.
Railroad shipping regulations: None.*

Hypersthene (MgFe)SiO_3.
A natural silicate of iron and magnesium containing a larger percentage of iron (up to 31.0% FeO) than enstatite (q.v.) and bronzite (q.v.). Color, ranges from dark-green to gray or greenish-black; gray or dark-gray streak; pearly or metalloidal luster.
Constants: Sp.gr. 3.4 to 3.5; hardness 5 to 6.
Occurrence: United States (New York, California, Colorado), Greenland, Norway, Sweden, Germany, Bohemia, Austria, Bavaria, Canada.

Hypnal (Chloropyrine; Chloral hydrate antipyrine) $C_{11}H_{12}N_2OCCl_3CH(OH)_2$.
Color and properties: Colorless crystals. Stated to combine the somnifacient effect of chloral with the anodyne effect of antipyrine.
Constants: M.p. 67°C.
Derivation: By mixing antipyrine with hydrated chloral and crystallizing.
Uses: Medicine (treatment of insomnia, unofficial).
Railroad shipping regulations: None.*

Hypnone. See Acetophenone.

"Hypo." See Sodium thiosulfate.

Hypo Black. See under Blacks.

Hypochlorite of Lime. See Calcium hypochlorite.

Hyponitrous Ether. See Ethyl nitrite.

Hypophosphorous Acid H_3PO_2.
Color and properties: Clear, colorless liquid; sour odor.
Constants: Sp.gr. 1.439; m.p. 26.5°C.
Soluble in water.
Derivation: Heating concentrated baryta water with white phosphorus and decomposing the barium hypophosphate with sulfuric acid, filtering the liquid and concentrating under reduced pressure.
Method of purification: Distillation.
Grades: Technical; U.S.P., 31%; 31°Bé.= 50%; 19°Bé.=35%; 17°Bé.=30%; 6.5°Bé.=10%.
Containers: ¼, 1, 5 lb. bottles; 1, 2, 5 gal. demijohns; 125 lb. carboys.
Railroad shipping regulations: None.*

Hypovanadic Hydrochloride. See Vanadium chloride.

Hyraldite C. See Hydrosulfite-formaldehyde compounds.

Hyraldite C Extra. See Hydrosulfite-formaldehyde compounds.

Hyssop Oil.
Color and properties: A colorless, liquid essential oil.
Constants: Sp.gr. 0.932.
Soluble in alcohol, ether, chloroform and benzene.
Derivation: Distilled from the herb, Hyssopus officinalis.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; preparation of liqueurs.
Railroad shipping regulations: None.*

Hytensl Bronze. A non-ferrous alloy containing 60% copper, 19% zinc, 10% aluminum, 6% iron and 5% manganese. It is resistant to cold dilute hydrochloric acid.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

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Iatrol $NHC_6H_5O_2C_2H_5OI_2$.
Color and properties: Grayish-white, odorless powder.
Soluble in alcohol, ether and chloroform; insoluble in water and glycerol.
Derivation: By the action of nascent iodine on certain coal-tar derivatives.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Boxes; tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Ibit (Bismuth oxyiodotannate).
Color and properties: Greenish-gray, odorless, tasteless powder. Becomes brownish on exposure.
Insoluble in alcohol, water or ether.
Derivation: By the interaction of a bismuth salt and iodotannic acid.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Medicine (substitute for iodoform in surgery, unofficial).
Railroad shipping regulations: None.*

Ice-machine Oils (Ammonia-compressor oils).
Light spindle oils are stated to be suitable for this purpose.
Constants: Gr. 26° to 27°Bé.; Saybolt viscosity 60 to 100 at 70°F.; flash point 325° to 360°F.; cold test 0° to 4°F.
Railroad shipping regulations: None.*

Ice Stone. See Cryolite.

Iceland Moss. See Cetraria.

Iceland Spar. See Calcite.

Ichthalbin (Ichthyol albuminate).
Color and properties: Grayish-brown, odorless, tasteless powder.
Insoluble in all solvents.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ichthargan (Silver ichthyol).
Color and properties: Brown, amorphous, stable powder. Contains 30% silver. As powerful a germicide as silver nitrate, but less irritating. Precipitated by sodium chloride and by albumin from its concentrated solution. Excess of albumin will redissolve the albuminous precipitate.
Soluble in water, glycerol, dilute alcohol; insoluble in ether, chloroform, concentrated alcohol.
Derivation: By the action of ichthyolsulfonic acid on silver.
Uses: Medicine (antiseptic, astringent, inflammations of mucous membrane, tonsilitis, pharyngitis, urethritis, eczema, other skin diseases, ulcerations, lymphangitis, unofficial).
Railroad shipping regulations: None.*

Ichthoform (Ichthyol-formaldehyde).
Color and properties: Brownish-black, odorless and tasteless powder.
Insoluble in all solvents.
Derivation: By the interaction of ichthyol and formaldehyde.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Ichthynat (Ammonium ichthynatum).
Color and properties: Brownish-black, syrupy liquid, burning taste, characteristic empyreumatic odor. Incompatible with acids, alkaloids, carbonates, hydroxides, mercuric chloride.
Soluble in water, alcohol-ether or alcohol-ether-water mixtures; partially soluble in alcohol and ether. Miscible with glycerol.
Derivation: An aqueous solution of sulfonated ammonium compounds derived from the action of sulfur upon distillates from certain bituminous shales.
Uses: Medicine (similar to ichthyol, unofficial).
Railroad shipping regulations: None.*

Ichthyocolla. See Isinglass.

Ichthyodin. See Isarol.

Ichthyol (Sulfonated bitumen; so-called "Ammonium sulfoïchthyolate" or "Ammonium-ichthyol sulfonate").
Color and properties: Thick, blackish-brown liquid; bituminous odor.
Soluble in alcohol and ether, water and glycerol.
Derivation: Originally by dry distillation of bituminous shale found in Seefeld, Tyrol, treated with sulfonic acid then neutralized with ammonia. Many substitutes are now made by similar treatment of shales from other districts.
Grades: Crude; refined.
Containers: Barrels.
Uses: Medicine (weak antiseptic, emollient, skin diseases).
Railroad shipping regulations: None.*

Ichthyol Albuminate. See Ichthalbin.

Ichthyol-formaldehyde. See Ichthoform.

Ichthyolidin.
Piperazine ichthyolate, stated to be an improved method of administering the drug piperazine in medicine. Unofficial.
Railroad shipping regulations: None.*

Idocrase. See Vesuvianite.

Igewsky's Reagent. An etching agent used in the microanalysis of carbon steels. It consists of a 5% solution of picric acid in absolute alcohol.

Ignatia (St. Ignatius bean).
Dried ripe seed of Strychnos ignatii.
Habitat: Philippines.
Grades: N.F.
Uses: Medicine (similar to nux vomica).

Ilang-ilang Oil. See Cananga oil.

Illicium (Star anise; Chinese anise).
Derivation: Fruit of Illicium verum.
Habitat: China.
Grades: Technical.
Containers: Bags.
Uses: Medicine; manufacture of liqueurs and volatile oils.
Railroad shipping regulations: None.*

Illicium Oil. See Anise oil.

Illium G. A non-ferrous alloy containing 60% nickel, 25% chromium and 7% copper. It offers good resistance to all concentrations of hot and cold sulfuric acid, cold hydrochloric acid, hot and cold nitric and acetic acids, sodium and ammonium hydroxides and to sea water, moist sulfurous atmospheres and mine waters.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Illuminating Oils.
Petroleum distillates suitable for use as illuminants when burned in a wick lamp. Actually, they are kerosene oils which consist of a white, mobile liquid composed of a mixture of hydrocarbons freed of gasoline and naphtha and also of the heavy hydrocarbons belonging to gas oil and lubricating oils, which would prevent proper burning of the oil in the lamps. The tentative definition of the American Society for Testing Materials for kerosene is as follows:

"A refined petroleum distillate having a flash point not below 73°F. (23°C.) as determined by the Abel tester [which is approximately equivalent to 73°F. (23°C.) as determined by the Tag Closed Tester, American Society for Testing Materials Standard Method D 56] ...."

The New York Produce Exchange defines kerosene as follows:

"Refined petroleum shall be standard white or better, with a burning test of 110°F. or upward, and of gravity not below 44°Bé.; 'United States Dispensatory' Standard."

United States Government Master Specifications for Lubricants and Liquid Fuels:

Kerosene:
Color: Not darker than No. 16 Saybolt.
Flash Point: Not lower than 115°F. (Tag closed tester).
Sulfur: Not exceed 0.125%.
Cloud Point: No cloud at 5°F.
Burning Test: Burns freely and steadily for 16 hours.

Long-time Burning Oil:
Color: Not darker than No. 21 Saybolt.
Flash Point: Not lower than 115°F. (Tag closed tester).
Sulfur: Not exceed 0.10%.
Cloud Point: No cloud at 0°F.
Burning test: Time required to burn 650 cc. of oil not less than 120 hours.

300° Mineral Seal Oil: Grade used for lamps in passenger coaches and for illuminating railroad equipment, and wherever a high flash illuminant is required. The oil must be free from water, glue and suspended matter.
Color: Not darker than No. 16 Saybolt.
Flashpoint: Not lower than 250°F. (Cleveland open cup).
Flock test negative.
Cloud Point: No cloud at 32°F.
Reaction: Shall be neutral.
Burning Test: Time required to burn 570 cc. of the oil shall not be less than 20 hours.

Due to there being so much overlapping, gravity as an identification test is somewhat unreliable. However, the following definitions are given in trade papers for general identification purposes:
New York Export Market: Water-white, gr. 43° to 45°Bé.; fire test 150°F.; standard white, gr. 42° to 44°Bé.; fire test, 110°F.
Gulf Export Market: Water-white, gr. 44°Bé.; standard white, gr. 41° to 43°Bé.
Pacific Export Market: Water-white, gr. 38° to 40°Bé.; fire test, 125 to 150°F.
Railroad shipping regulations: None.*

Ilmenite (Menaccanite; Titanic iron ore) $(Fe,Ti)_2O_3$ or $FeTiO_3$ or $FeO.TiO_2$. Sometimes with some replacement of iron by Mg or Mn.
Iron-black mineral, black to brownish-red streak, submetallic luster. Resembles magnetite (q.v.) in appearance but is readily distinguished by feeble magnetic character.
Constants: Sp.gr. 4.5 to 5; hardness 5 to 6.
Occurrence: United States (New York, Connecticut, Massachusetts, Florida), Canada, Norway, Sweden, England, Austria, Switzerland, France.
Uses: Titanium paints and enamels; ferrotitanium; puddling-furnace linings.

Imhoff Sludge. See Sludge.

Iminodiphenyl. See Carbazole.

Iminourea. See Guanidine.

Immortelles. See Helichrysum.

Imperatoria (Master-wort; Felon grass; Felon-wort).
Derivation: Rhizome of Imperatoria ostruthium.
Habitat: Central and southern Europe and United States.
Grades: Technical.
Containers: Boxes.
Uses: Medicine; manufacture of liqueurs.
Railroad shipping regulations: None.*

Imperial Green. See Copper acetoarsenite.

Imperial Red. A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Impsonite. An asphalt much like albertite, but almost insoluble in turpentine. Found in Oklahoma.

Indanthrene $C_{28}H_{14}O_4N_2$.
Color and properties: A vat dye. Strong blue powder, strong metallic reflex. Very stable.
Soluble in dilute alkaline solutions.
Derivation: By fusion of beta-aminoanthraquinone with caustic potash in the presence of potassium nitrate. The crude indanthrene A is separated and heated in a solution of caustic soda and sodium hydrosulfite. On cooling the sodium salt of the hydro-derivative is separated, washed with solutions of caustic soda and sodium hydrosulfite and the pure indanthrene A produced by dissolving in hot water and allowing free access of air.
Uses: Dyeing unmordanted cotton blue.
Railroad shipping regulations: None.*

Indanthrene Golden Orange. See Pyranthrene.

Indanthrene Yellow. See Flavanthrene.

Indene. See Coumarone, para-.

India-rubber. See Caoutchouc.

Indian Arrow-wood. See Euonymus.

Indian Balsam. See Peru Balsam.

Indian Barley Caustic. See Sabadilla.

Indian Cannabis. See Cannabis indica.

Indian Corn. Maize.

Indian Geranium Oil. See Palmarosa oil.

Indian Grass Oil. See Palmarosa oil.

Indian Gum.
A series of gums obtained from trees found in the forests of India and Ceylon. Some of these are obtained from (a) Prosopis spicigera L., small angular, yellowish fragments or large ovoid, amber tears. Forms a dark colored tasteless mucilage with water and is similar to mesquite gum in its reaction to chemical reagents. (b) Feronia limonia R., small, irregular pale yellow to reddish-brown tears. Forms a tasteless, colorless, thick mucilage resembling arabic gum. (c) Anogeissus latifolia C.
Railroad shipping regulations: None.*
See also Bassora gum, Kuteera gum, Sterculia gum.

Indian Hemp. See Cannabis indica.

Indian Laburnum. See Cassia fistula.

Indian Physic. See Gillenia.

Indian Pink. See Spigelia.

Indian Pipestone. See Catlinite.

Indian Poke. See Veratrum.

Indian Red (Iron saffron). A pigment formerly consisting of a variety of red hematite (q.v.) imported from the East but now made artificially by calcining copperas. There is no pigment, with possibly the exception of lithopone and artificial barium sulfate, which will approach Indian red in fineness of grain. It is also used for polishing gold, silver and other metals.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Indian Saffron. See Curcuma.

Indian Shot. See Canna.

Indian Tobacco. See Lobelia.

Indian Turmeric. See Hydrastis.

Indian Wood Oil. See Gurjun balsam oil.

Indian Yellow (Aureolin). A yellow pigment distinguished from other yellow pigments by being unaffected by hydrogen sulfide. It is durable, without action upon other pigments and is permanent in oils and water color. It consists of a double nitrite of cobalt and potassium and is prepared by adding excess of potassium nitrite solution to a solution of cobalt nitrate acidified with acetic acid. Note: It is desirable to use strong solutions since the precipitate obtained by using dilute solutions is coarse and has little covering power.

Indian Yellow (Purree; Piuri; Purrea arabica). A pigment composed, chiefly, of the impure basic magnesium salt of euxanthic acid, $C_{19}H_{16}MgO_{11} \cdot 5H_2O$, obtained in India by heating the urine of cattle that have been fed upon mango leaves. It comes into commerce in lumps, weighing about 50 to 60 grams, which are dark brown on the exterior, but on fracture show a fine orange-yellow color. Purree is only moderately permanent in oils, less so as a water color and is harmful to some of the lakes. It is well adapted for frescos.

Indicator (Chemical). A chemical system the directly observable properties of which permit its state to be inferred, thereby revealing the state of another system when interaction of the two systems shall have occurred.

An indicator is usually given the name of the substance used in forming the system. For example, the acid-base indicator called phenolphthalein is a system composed of several ions, undissociated molecules and tautomers thereof. It is given the name of the substance used in preparing the reagent.

Acid-base indicator: A system usually formed from an organic acid or base the color of whose solution changes in an orderly manner mainly with the hydrogen-ion activity of the solution. It is convenient to formulate the conduct, in aqueous solution, of those indicators which are listed below and to which pK values are assigned (except meta-cresol purple and thymol blue in acid solutions) by means of the relation

$$\text{pH} = \text{pK} + \log \frac{a}{1 - a}$$

Here a is the fraction of the total concentration of all indicator species with which is associated the color found at pH values at least 2.5 units higher than the value of pK. For discussion of the theory and use of acid-base indicators see the third edition of Clark's "The Determination of Hydrogen Ions," Baltimore, The Williams & Wilkins Co., 1928.

Absorption indicator: A system one component of which is adsorbed by a solid phase of the system under test and indicating by color or some other property the state of the system under test. Example: The formation of a dark red when fluorescein is adsorbed on a silver halide.

End-point indicator: An indicator so selected as to reveal the equivalence point in a titration.

Humidity indicators: Certain chemical systems, e.g., those containing certain salts of cobalt change color with changes in the humidity of the environment.

Oxidation-reduction indicator: A system which upon being converted to the oxidized or the reduced state suffers a change in color.

For a summary of data upon reversible oxidation-reduction indicators see Table L, page 683, "The Determination of Hydrogen Ions," Baltimore, The Williams and Wilkins Co., 3rd edition.

A semireversible oxidation-reduction indicator is illustrated by the case of ortho-toluidine. Partial oxidation within certain limits of pH produces a blue compound formed by the union of oxidant and reductant. This subsequently decomposes to another and more complex blue compound. If the oxidation takes place in acid solution, as in the test for free chlorine, a yellow solution is formed.

INDICATORS SELECTED BY CLARK AND LUBS (1917),§ SUPPLEMENTED BY COHEN (1927)†

(From Clark—The Determination of Hydrogen Ions, 3d edition, 1928.)

Common Name	Molecular Weight	A	pK	Range	Color Change Acid→Alkaline	B	C	Absorption Maximum	
								Acid	Alkali
				pH		pH	pH	mμ	mμ
Meta-cresol purple †	382	26.2	1.51‡	1.2-2.8	red-yellow	conc. HCl	6	533	
Thymol blue §	466	21.5	1.5‡	1.2-2.8	red-yellow	conc. HCl	6	544	
Brom phenol blue §	669	14.9	3.98	3.0-4.6	yellow-blue	0	7		592
Brom cresol green †	698	14.3	4.67	3.8-5.4	yellow-blue	1	8		617
Chlor phenol red †	423	23.6	5.98	4.8-6.4	yellow-red	2	9		573
Brom phenol red †	512	19.5	6.16	5.2-6.8	yellow-red	3	10		574
Brom cresol purple §	540	18.5	6.3	5.2-6.8	yellow-purple	3	10		591
Brom thymol blue §	624	16.0	7.0	6.0-7.6	yellow-blue	4	10		617
Phenol red §	354	28.2	7.9	6.8-8.4	yellow-red	5	11		558
Cresol red §	382	26.2	8.3	7.2-8.8	yellow-red	5	11		572
Meta-cresol purple †	382	26.2	8.32	7.4-9.0	yellow-purple	5	11		580
Thymol blue §	466	21.5	8.9	8.0-9.6	yellow-blue	6	12		596
Cresolphthalein §	...	...	[9.4]	8.2-9.8	colorless-red	6	12		...

A = cubic centimeters of 0.01 N NaOH required per 0.1 gram indicator to form monosodium salt. Dilute to 250 cc. for 0.04 per cent reagent.

B = approximate pH value of solution required for full "acid color" appertaining to pH range indicated.

C = approximate pH value of solution required for full "alkaline color" appertaining to pH range indicated.

‡ Data by Holmes and Snyder (1925). It is not clear whether they used Clark and Lubs' (1916) preliminary data for HCl-KCl mixtures in calculations for which a large Bjerrum extrapolation was employed, or their own measurements, and, if their own, what basis of calculation was employed.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

SORENSEN'S SELECTION OF INDICATORS

(From Clark—The Determination of Hydrogen Ions, 3d edition, 1928.)

	Composition of Test Solution		Useful Range pH		Sensitivity to Neutral Salts	Usefulness in Presence of			Stability on Standing
						True proteins	High conc. of products of proteolysis	Chloroform and toluene	
Methyl violet 6B	0.01-0.05 per cent aqueous	y	0.1-3.2	v	high	fair	good	with chloroform not, with toluene useful	acid solutions fade
Mauve	0.01-0.05 per cent aqueous		0.1-2.9		high	fair	good	as above	as above
Benzeneazodiphenylamine	0.01 gram in 1 cc. N HCl + 50 cc. alcohol + 49 cc. water	p	1.2-2.1	y	low	not	fair	not	moderate
Tropaeolin 00	0.01 per cent aqueous	r	1.4-2.6	y	low	not	fair	good	good
Metanil yellow	0.01 per cent aqueous	r	1.2-2.3	y	low	not	fair	good	good
Benzeneazobenzylaniline	0.02 gram in 1 cc. N/10 HCl + 50 cc. alcohol + 49 cc. water	p	2.3-3.3	y	low	not	good	not	moderate
Para-benzenesulfonic acid-azo-benzylaniline	0.01 per cent aqueous	r	1.9-3.3	y	low	not	fair	good	good
Para-benzenesulfonic acid-azo-meta-chlorodiethylaniline	0.01 per cent aqueous	r	2.6-4.0	y	low	not	fair	good	good
Benzeneazodimethylaniline	0.01 gram in 0.1 cc. N/10 HCl + 80 cc. alcohol + 20 cc. water	r	2.9-4.0	y	low	not	good	not	moderate
Methyl orange	0.01 per cent aqueous	r	3.1-4.4†	y	low	not	fair	good	good
Benbeneazo-alpha-naphthylamine	0.01 gram in 0.4 cc. N/10 HCl + 30 cc. alcohol + 70 cc. water	r	3.7-5.0	y	low	not	good	not	moderate
Para-benzenesulfonic acid-azo-alpha-naphthylamine	0.01 gram in 60 cc. alcohol + 40 cc. water	r	3.5-5.7	y	low	not	good	good	good
Methyl red	0.02 gram in 60 cc. alcohol + 40 cc. water	r	4.2-6.3	y	low	S.C.	good	good	moderate
Para-nitrophenol	0.4 gram in 6 cc. alcohol + 94 cc. water	c	5.0-7.0†	y	moderate	good	good	good	good
Neutral red	0.01 gram in 50 cc. alcohol + 50 cc. water	r	6.8-8.0	y	low	S.C.	good	S.C.	good
Rosolic acid	0.04 gram in 40 cc. alcohol + 60 cc. water	br	6.9-8.0	r	low	fair	good	fair	good
Tropaeolin 000 No. 1	0.01 per cent aqueous	v	7.6-8.9	p	low	good	good	good	good
Para-alpha-naphtholphthalein	0.1 gram in 150 cc. alcohol + 100 cc. water	y	7.3-8.7	b	moderate	S.C.	good	good	fair
Phenolphthalein	0.05 gram in 50 cc. alcohol + 50 cc. water	c	8.3-10.0†	r	moderate	S.C.	good	good	good — fades in strong alkali
Thymolphthalein	0.04 gram in 50 cc. alcohol + 50 cc. water	c	9.3-10.5	b	moderate	S.C.	good	good	fades in moderate alkali
Alizarin yellow R	0.01 per cent aqueous	y	10.1-12.1	y			good		good
Tropaeolin 0	0.01 per cent aqueous	y	11.1-12.7	o			fair		good

S.C. = useful in special cases. b = blue; br = brown; c = colorless; o = orange; p = pink; r = red; v = violet; y = yellow.

† Apparent pK values referred to standard buffers: Methyl orange (44), 3.7. Methyl red (59), see table 13.†† Paranitrophenol (12), see table 19.†† Neutral red (158), 6.85. Phenolphthalein, see table 13.††

†† Clark, The Determination of Hydrogen Ions. (See above.)

"ONE-COLOR" INDICATORS DEVELOPED BY MICHAELIS.

(From Clark—The Determination of Hydrogen Ions, 3d edition, 1928.)

Common Name	Chemical Name	Color	pK at 18° C.	Range	Solution
Beta-dinitrophenol	1-oxy-2:6-dinitrobenzene	yellow	3.69	2.2- 4.0	0.1 gram in 300 cc. water
Alpha-dinitrophenol	1-oxy-2:4-dinitrobenzene	yellow	4.06	2.8- 4.5	0.1 gram in 200 cc. water
Gamma-dinitrophenol	1-oxy-2:5-dinitrobenzene	yellow	5.15	4.0- 5.5	0.1 gram in 200 cc. water
Para-nitrophenol	1-oxy-4-nitrobenzene	yellow	7.18	5.2- 7.0	0.1 gram in 100 cc. water
Meta-nitrophenol	1-oxy-3-nitrobenzene	yellow	8.33	6.7- 8.4	0.3 gram in 100 cc. water
Phenolphthalein	phenolphthalein	red	(9.73)	8.4-10.5	0.04 gram in 30 cc. alcohol + 70 cc. water
Alizarin yellow GG (salicyl yellow)	m-nitrobenzene-azo-salicylic acid	yellow	(11.16)	10.0-12.0	0.05 gram in 50 cc. alcohol + 30 cc. water

An irreversible oxidation-reduction indicator is illustrated by the use of picric acid which can be irreversibly reduced to red picramic acid.

Precipitation Indicator: A system one component of which precipitates when a certain state of the solution is reached. Example 1. The precipitation of isonitroso acetyl-para-amino azobenzene in the zone of pH 10.95 to 11.01 in aqueous, borax-sodium hydroxide, buffer solutions. Example 2. The precipitation of silver chloride when the silver ion and chloride ion concentrations rise above certain very low values.

Radioactive Indicator: A radioactive system the radioactivity of which is used in following the changes in another system. See Paneth, "Radio Elements as Indicators and Other Selected Topics in Inorganic Chemistry," New York, McGraw Hill Book Co.

Specific Indicator: A system which acts in a more or less specific manner and which within limits may be used for detecting the rise of a specific substance above a certain minimal concentration. Example 1. The formation of a complex having a blue color when starch and iodine react. Example 2. The formation of red ferric thiocyanate from ferric iron and thiocyanate.

Indigo.
Color and properties: Dark blue, odorless, tasteless powder.
Soluble in chloroform, benzene phenol, aniline, paraffin and turpentine oil.
Derivation: (1) Natural. By fermentation of the cut twigs and leaves of various species of indigofera with water to decompose the glucoside, indican. The solution is oxidized to precipitate the indigo. (2) Synthetic.
Grades: Technical; pure.
Containers: Barrels; tins.
Uses: Textile dyeing and printing; inks; manufacture of indigo derivatives; ingredient of tobacco fertilizers; paints; laundering; rubber manufacture; analytical reagent.
Railroad shipping regulations: None.*

Indigo Blue. See Indigotin.

Indigo Carmine (Soluble indigo; Indigo extract; Sodium indigotindisulfonate; Sodium coerulinsulfate) $C_{16}H_8N_2O_2(SO_3Na)_2$.
Color and properties: Blue powder or pasty mass.
Soluble in water.
Derivation: Indigotindisulfonic acid is treated with soda.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyeing; medicine (to color tablets of corrosive sublimate).
Railroad shipping regulations: None.*

Indigo Extract. See Indigo carmine.

Indigo, Soluble. See Indigo carmine.

Indigo, Synthetic. See Indigotin.

Indigo, Wild. See Baptisia.

Indigotin (Synthetic indigo blue) $C_{16}H_{10}N_2O_2$.
Color and properties: Dark blue, crystalline powder; bronze luster.
Constants: Sp.gr. 1.35; m.p.: Sublimes at 300°C.; b.p. 390°C.
Soluble in aniline, nitrobenzene, chloroform, glacial acetic acid and concentrated sulfuric acid; insoluble in water and alcohol.
Derivation: (a) By fusing phenylglycocoll-orthocarboxylic acid with alkali. (b) From anthranilic acid.
Grades: Technical; pure.
Containers: Wooden kegs.
Uses: Dyeing.
Railroad shipping regulations: None.*

Indium In.
Color and properties: Ductile, shiny, silver-white metal; softer than lead.
Constants: Sp.gr. 7.362; m.p. 155°C.; b.p. 700°C.
Soluble in acids.
Derivation: By the reduction of indium oxide.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Indium salts.
Railroad shipping regulations: None.*

Indoform (Salicylic acid methylene acetate).
Color and properties: White powder; acid, astringent taste.
Constants: M.p. 108° to 109°C.
Soluble in hot water; very slightly soluble in cold water.
Derivation: By the action of formaldehyde on acetylsalicylic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Indole (Ketole) $C_6H_4(CHNH)CH$.
Color and properties: Colorless to yellowish scales, turning red on exposure to light and air; intense fecal odor.
Constants: M.p. 52°C.; b.p. 254°C.
Soluble in alcohol, ether and hot water.
Derivation: By heating ortho-nitrocinnamic acid with potassium hydroxide and iron filings.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Chemical reagent; perfumery; medicine.
Railroad shipping regulations: None.*

"Infrax." A registered proprietary name for porous, fire-clay insulating brick.
Physical characteristics: White, high alumina refractory clay; porosity 70%; weight per cu.ft. 51 lbs.; pyrometric cone equivalent cone 32; application range up to 2,650°F.; thermal conductivity 5 B.t.u. per sq. ft. per inch thick per °F. per hour; refractory product.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: A calcined porous fire-clay, self-bonded, kiln fired.
Grades: Brick and simple shapes.
Containers: Cartons.
Railroad shipping regulations: None.*

Infusions. Aqueous solutions obtained by treating drugs with hot or cold water, without boiling. Generally prepared by pouring boiling water upon the vegetable substance and macerating the mixture in a tightly closed vessel until the liquid cools. When not otherwise specified, they are of 5% strength, by weight. The infusion of digitalis is the only one officially recognized in the Tenth Decennial Revision of the United States Pharmacopoeia.

Infusorial Earth. See Diatomaceous earth.

Ingresene. Trade name for a product used in the textile industry for wetting out and dyeing; in the leather industry, to assist in the penetration of pigment finishes; in the hat dyeing field, for wetting out and dyeing. It facilitates the wetting out of textiles and hats, and promotes rapid penetration of the dye into the fabric. It is stated to be water soluble and ready for application.

Inks. Colored liquids used for writing, drawing, stamping, printing, etc., usually on paper.

Writing Ink.

Gallotannate of iron ink. The familiar blue-black ink of commerce. This type of ink depends upon the formation of the black gallotannate of iron by the reaction between ferrous sulfate and tannic and gallic acids either in the C.P. form or as the water extract from gall-nuts. A mineral acid such as hydrochloric is added to retard the oxidation of the iron compounds so that the ink will flow freely from the pen. To make the writing immediately legible a dye, usually blue, is added and a small amount of a preservative such as phenol is introduced to prevent decomposition. This ink does not fade appreciably in light and is suitable for permanent records. The formula for Government Standard Writing Ink is as follows:

	Grams
Tannic acid	11.7
Gallic acid	3.8
Ferrous sulfate	15.0
Hydrochloric acid, dilute, U.S.P.	12.5
Carbolic acid (phenol)	1.0
Soluble blue Schultz No. 539 (Col. Ind. No. 707)	3.5

Water to make a volume of 1,000 cc.

Copying Ink. These inks must be sufficiently concentrated so that a film is deposited on the surface of the paper from which a press copy can be made. Gum arabic or dextrin is usually added for this purpose. A typical copying ink is of twice the strength as the Government Standard writing ink and 10 grams of gum arabic are added per liter of water.

Hectograph Ink. A method for producing duplicate copies which finds a limited use when carbon copies are not feasible is by use of the hectograph. This is either a clay or glue-glycerol mixture which presents a sufficiently moist surface to absorb some of the dye from the writing which is placed in contact with it. The ink used for this purpose contains a large amount of water-soluble dye, such as crystal violet, Schultz No. 516 (Col. Ind. No. 681) and a hygroscopic substance such as glycerol or glucose.

Indelible Ink. Formerly the most common type was an ammoniacal solution of a silver salt which required the application of heat or light for development. Many inks now on the market are solutions of a suitable dye such as nigrosine in aniline, phenol, or cresol. They are used principally as laundry-marking inks.

Sympathetic Inks. Writing fluids which yield characters that remain invisible until heated or treated with a suitable reagent. Solutions of lead salts turn dark when exposed to fumes of ammonium sulfide; treatment of a ferric salt with a ferrocyanide solution produce a bright blue color; starch solutions become visible when exposed to iodine vapors. Heat develops writing made with dilute sulfuric acid, solutions of ammonium chloride, and of cobalt salts, and lemon and onion juices.

Prussian Blue Ink. A solution of soluble Prussian blue in water. Prussian blue is soluble in the form of the oxalate or if it is prepared by adding an excess of ferrocyanide when a soluble precipitate containing alkali separates. This type of ink does not fade in light but can be easily eradicated by alkalis. An alkali-resistant blue or black dye is sometimes added to overcome this difficulty.

Dyestuff Inks. A solution of a dye of suitable color in water. These inks are non-corrosive and free flowing but possess no permanence in light and can be easily eradicated. Synthetic dyes have now practically displaced the logwood formerly used.

Concentrated Inks. These are sold in the paste, powdered or liquid form. The powdered form usually consists of sufficient synthetic dye to make the specified amount of ink. A few commercial ink powders contain the dry ingredients necessary for the gallotannate of iron ink. A crystalline acid salt or organic acid must be substituted for the liquid hydrochloric acid. The paste and concentrated liquid forms are usually of the gallotannate of iron type with the amount of water diminished.

Carbon Inks. Carbon or carbonaceous compounds in a finely divided state suspended in solution. India or Chinese ink is made from carbon and a suitable binding material such as glue. It appears on the market in solid sticks which are rubbed up with water when ready for use. Modern carbon inks are made from mixtures of gum arabic, shellac and borax with carbon in suspension. The borax reacts with the shellac to form a soap which is soluble in water but forms an insoluble film on paper. The gum arabic acts as a protective colloid. These inks find their widest application as waterproof drawing inks but there are a few brands manufactured for ordinary writing purposes.

Stamp-pad Inks. Those intended for use with rubber stamps are solutions of suitable dyes in a solvent such as glycerol, acetone, methyl alcohol or ethyl acetate. Those used with metal stamps have a pigment or oil-soluble dye incorporated in a non-drying oil such as castor to which a volatile thinner has been added.

Printing Inks. Oil-base inks which contain pigments of the colors desired. The oil base may contain one or more of the following ingredients: Boiled linseed oil, rosin oil, mineral oil, rosin, hard or varnish gums and soap. The proportion of these ingredients and of the pigments are varied according to the consistency the ink must have for a given kind of printing. Linseed oil is used for fine book work while rosin oil and rosin are more suitable for newspaper work where the ink is rapidly absorbed by the paper.

Insane Root. See Hyoscyamus.

Insect Powder. The Insecticide and Fungicide Board of the United States Department of Agriculture recognizes as insect powder an insecticide made from the powdered flower heads of several species of Chrysanthemum. There are two principal varieties, Dalmatian and Persian. At present, insect flowers are cultivated commercially in Dalmatia, Japan, Montenegro, Australia, Algeria and United States (California), the principal commercial supply coming from the first three named countries. See also Pyrethrum flowers.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Insect Wax. See Chinese wax.

Insipin
$O(CH_2COOC_{20}H_{23}N_2O)_2.H_2SO_4.3H_2O$.
Quinine diglycollic sulfate brought forward as a substitute for quinine in medicine. Stated to be almost tasteless and very sparingly soluble in water and alcohol. Unofficial.
Railroad shipping regulations: None.*

Insipin Hydrochloride. A soluble salt of insipin (q.v.) adapted for administering quinine hypodermically in medicine.
Railroad shipping regulations: None.*

Insulin. A pancreatic extract which greatly increases the combustion of sugar and leads to a reduction of the amount of glucose in the blood.
Used in medicine (treatment of diabetes, unofficial).
Railroad shipping regulations: None.*

Intarvin. A fat containing an uneven number of carbon atoms. It consists of approximately 82% glyceryl margarate, 12% liquid petrolatum and 6% water.
Used in medicine (in the treatment of diabetes. Unofficial).
Railroad shipping regulations: None.*

Inula (Scab-wort; Elecampane; Horse-heal; Helenium).
Dried rhizome and root of Inula helenium.
Habitat: Central Asia, Europe and eastern United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (antiseptic and germicide).
Railroad shipping regulations: None.*

Inula Camphor. See Helenin.

Inulin (Alant starch; Dahlin; Menyanthin).
Color and properties: Horny, colorless, amorphous lumps or white powder.
Soluble in hot water.
Derivation: A carbohydrate from the bulbs of Dahlia variabilis.
Grades: Technical.
Containers: Wooden barrels.
Uses: Diabetic bread; manufacture of fructose.
Railroad shipping regulations: None.*

Invar. See Ferronickel.

Invertase. See Convertit.

Invertin. See Convertit.

Invertin Zymase. See Convertit.

Iodalbacid (Albumin iodate; Iodised albumin).
Color and properties: Cream-colored powder, odorless, tasteless. Contains 10% iodine in intramolecular combination.
Soluble in water.
Uses: Medicine (less irritant method of iodine treatment, antisyphilitic, unofficial).
Railroad shipping regulations: None.*

Iodargyrite (Iodyrite) AgI.
One of the cerargyrite or natural silver haloid (q.v.) group. Yellow or yellowish-green in color. Contains 46.0% silver.
Constants: Sp.gr. 5.5 to 5.7; hardness 1.
Occurrence: United States (Nevada, New Mexico), Australia, Chile.

Iodembolite Ag(Cl,Br,I).
One of the cerargyrite or natural silver haloid (q.v.) group. Greenish-yellow to orange-yellow in color. The ratio of chlorine, bromine and iodine varies widely.

Iodeosine (Tetraïodofluorescein)
$C_{20}H_8I_4O_5$.
Color and properties: Red powder.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of fluorescein and iodine in presence of iodic acid.
Grades: Technical.
Containers: Glass bottles.
Uses: Indicator in analytical chemistry.
Railroad shipping regulations: None.*

Iodethylene. See Diïodoform.

Iodic Acid HIO_3.
Color and properties: Colorless, rhombic crystals or white, crystalline powder.
Constants: Sp.gr. 4.629; m.p. 110°C.
Soluble in cold and hot water.
Derivation: By adding sulfuric acid to a solution of barium iodate and subsequent filtration and crystallization.
Method of purification: Crystallization.
Containers: 1 lb. bottles; tins.
Grades: Technical; U.S.P.
Uses: Analytical chemistry; medicine.
Railroad shipping regulations: White label.

Iodin. Iodized arachis oil used in medicine as a means of administering iodine internally, unofficial.

Iodine I_2.
Color and properties: Purplish-black flat, volatile crystals; poisonous; corrosive!
Constants: Sp.gr. 4.98; m.p. 114.2°C.; b.p. 184°C.
Soluble in alcohol, carbon bisulfide, chloroform, ether, glycerol and alkaline iodide solutions; insoluble in water.
Derivation: From the ashes of seaweeds or mother liquors of Chile saltpeter by the addition of sodium bisulfite solution. The precipitated iodine is collected and dried.
Method of purification: Sublimation.
Grades: Technical; C.P.; U.S.P.
Containers: ¼, 1, 2, 5 lb. bottles; 5, 10, 25, 50 lb. jars; 100 lb. cases of 2 (50 lb.) jugs; 100, 200 lb. kegs.
Uses: Medicine (germicide, antiseptic); organic compounds; dyes (aniline dyes, phthalein dyes); catalyst in intermediate manufacture; iodides; iodates; tincture of iodine; pharmaceuticals; leather manufacture; testing paper; process engraving and lithography; special soaps; analytical reagent.
Railroad shipping regulations: None.*

Iodine Bisulfide. See Sulfur iodide.

Iodine Bromide. See Iodine monobromide, pentabromide and tribromide.

Iodine Chloride. See Iodine monochloride and trichloride.

Iodine Cyanide (Cyanogen iodide) ICN.
Color and properties: Colorless needles; very pungent odor; acrid taste; violent poison!
Constants: M.p. 146.5°C.
Soluble in water, alcohol and ether.
Derivation: By heating a metal cyanide with iodine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Taxidermists' preservative.
Railroad shipping regulations: Class B poison (?)*

Iodine Monobromide (Bromide iodide) IBr.
Color and properties: Crystalline, purplish-black mass.
Constants: M.p. 36°C.
Soluble in water.
Derivation: By the interaction of iodine and bromine.
Grades: Technical.
Containers: Glass bottles; metal boxes.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Iodine Monochloride ICl.
Color and properties: Reddish-brown, oily liquid.
Constants: M.p. 25°C.; b.p. 101°C.
Soluble in alcohol and dilute hydrochloric acid.
Derivation: By the action of dry chlorine on iodine.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry; organic synthesis.
Railroad shipping regulations: White label(?)*

Iodine Pentabromide IBr_5.
Color and properties: Brown liquid.
Soluble in water.
Derivation: By the interaction of bromine and iodine.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: White label(?)*

Iodine Tincture, U.S.P. A solution of iodine and potassium iodide in alcohol.

Iodine Tincture, Colorless. A solution of iodine and potassium iodide in an aqueous solution of sodium thiosulfate.

Iodine Tribromide IBr_3.
Color and properties: Brown liquid.
Soluble in alcohol.
Derivation: By the interaction of iodine and bromine.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: White label(?)*

Iodine Trichloride ICl_3.
Color and properties: Orange-yellow, deliquescent, crystalline powder; pungent, irritating odor; poisonous!
Constants: M.p. 33°C.
Soluble in water, alcohol and benzene.
Derivation: By interaction of iodine and chlorine.
Grades: Technical.
Containers: Amber glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Iodipin (Sesamé oil, iodized).
Color and properties: Yellowish oily liquid, oleaginous taste. Contains from 9.8 to 11.2% iodine.
Uses: Medicine (asthma, arterial sclerosis, unofficial).
Railroad shipping regulations: None.*

Iodisovaleryl Urea. See Iodival.

Iodistol. See Thymol iodide.

Iodival (Iodisovaleryl urea) $(CH_3)_2HCCHICOHNNH_2$.
Color and properties: White powder containing 47% iodine.
Constants: M.p. 180°C.
Soluble in alcohol, hot water; insoluble in cold water.
Uses: Medicine (syphilis, asthma, scrofula, unofficial).
Railroad shipping regulations: None.*

Iodized Albumin. See Iodalbacid.

Iodized Oil (Ioduretted oil). Almond oil, containing dissolved iodine, used for linimental purposes in medicine.

Iodoanisole, Para-. See Isoform.

Iodochloroxyquinoline (Nioform; Vioform) $C_9NH_6(OH)ICl$.
Color and properties: Greenish-yellow bulky powder, almost inodorous. Non-irritant, more powerful germicide than iodoform and less toxic.
Insoluble in water.
Uses: Medicine (substitute for iodoform in surgery, unofficial).
Railroad shipping regulations: None.*

Iodocresol (Cresol iodide) $C_6H_3I(CH_3)OH$.
Color and properties: Reddish-violet, amorphous powder, odorless. Contains 55% iodine.
Soluble in chloroform, alkaline solutions; difficultly soluble in ether; insoluble in water, alcohol, acids.
Derivation: Interaction of potassium iodide solution and a cresol-water emulsion.
Uses: Medicine (powerful non-irritant antiseptic, local anesthetic, syphilitic and other ulcers, eczema, intertrigo, other skin diseases, unofficial).
Railroad shipping regulations: None.*

Iodocrol (Carvacrol iodide) $C_{10}H_{13}OI$.
Color and properties: Grayish-yellow, or buff-colored, amorphous powder, faint aromatic odor. Combines antiseptic properties of iodine and carvacrol.
Soluble in ether, chloroform, petroleum, benzine, carbon bisulfide, volatile and fixed oils; insoluble in water.
Uses: Medicine (surgical dressings in eczema, pruritus, chancres, chancroids, unofficial).
Railroad shipping regulations: None.*

Iododihydroxypropane. See Alival.

Iodoethane. See Ethyl iodide.

Iodoethylene. See Diïodoform.

Iodoform (Triïodomethane; Methenyl triïodide; Formyl triïodide).
Color and properties: Small, yellow crystals or powder; characteristic, penetrating odor.
Constants: Sp.gr. 4.08; m.p. 119°C.
Soluble in alcohol, glycerol, chloroform, carbon bisulfide and ether; insoluble in water.
Derivation: (a) By heating, acetone or methyl alcohol with iodine in presence of an alkali or alkaline carbonate. (b) Electrolytically, by passing a current through a solution containing potassium iodide, alcohol and sodium carbonate.
Grades: Technical; U.S.P.
Containers: 1, 5, 10 lb. bottles; 25 lb. jars; 100 lb. kegs.
Uses: Medicine (antiseptic dressing).
Railroad shipping regulations: None.*

Iodoformal (Iodoforminethyliodide) $C_6H_{12}NC_2H_6ICHI_3$.
Color and properties: Yellow needles or heavy powder. More powerful antiseptic than iodoformin.
Constants: Fusing point 128°C.
Soluble in boiling water.
Derivation: Reaction between ethyl iodide and iodoformin.
Uses: Medicine [similar to iodoformin (q.v.), unofficial].
Railroad shipping regulations: None.*

Iodoformin (Iodoformohexamethylenetetramine; Iodoforminethyliodide) $CHI_3(CH_2)_6N_4$.
Color and properties: White crystalline powder, faint iodoform odor. Decomposes in wounds and boiling water liberating 75% free iodoform.
Constants: Fusing point 178°C.
Insoluble in water.
Derivation: Action of alcoholic iodoform solution on methanamine.
Uses: Medicine (more powerful bactericide than iodoform, gonorrhea, urethritis, dusting powder for wounds, unofficial).
Railroad shipping regulations: None.*

Iodoforminethyliodide. See Iodoformin.

Iodoformohexamethylenetetramine. See Iodoformin.

Iodogallicin (Bismuth oxyiodomethylgallol) $C_6H_2COOCH_3(OH)_2OBiOHI$.
Color and properties: Light, amorphous, dark-gray powder. Contains 38.4% bismuth, 23.6% iodine.
Insoluble in usual solvents.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Action of bismuth oxyiodide on methyl gallate.
Uses: Medicine (antiseptic powder, siccative, unofficial).
Railroad shipping regulations: None.*

Iodoglidin (Iodized glidin).
Color and properties: Dark yellow powder, containing 10% iodine. Absorbed slower than inorganic iodides.
Uses: Medicine (means of administering iodine internally, unofficial).
Railroad shipping regulations: None.*

Iodohydromol. See Thymol iodide.

Iodole (Pyrrole tetraiodide) C_4I_4NH.
Color and properties: Light grayish-brown, crystalline powder, odorless, tasteless.
Soluble in ether, alcohol, chloroform, fixed oils; difficultly soluble in water.
Derivation: Pyrrole (obtained from bone oil) is subjected to the action of a solution of iodine in potassium iodide. The precipitated iodole is dissolved in hot alcohol and precipitated by adding water.
Uses: Medicine (substitute for iodoform, tuberculous laryngitis, vaginitis, chancres, ulcers, suppurative adenitis, wound dressing, unofficial).
Railroad shipping regulations: None.*

Iodolen. An iodole-albumin compound used in medicine as a surgical dressing.
Railroad shipping regulations: None.*

Iodoline (Quinoline chloromethylate iodochloride) $C_9H_7NCH_3ClICl$.
Color and properties: Yellow powder.
Derivation: Action of a chloride on methyl iodide and quinoline.
Uses: Medicine (iodoform substitute, unofficial).
Railroad shipping regulations: None.*

Iodomenin. An iodized bismuth-casein compound containing 10% iodine. Used in medicine as a means of administering iodine internally. Unofficial.
Railroad shipping regulations: None.*

Iodomethane. See Methyl iodide.

Iodophenin. Iodophenacetin used in medicine as an iodoform substitute. Unofficial.
Railroad shipping regulations: None.*

Iodosol. See Thymol iodide.

Iodotannic Acid (Iodotannin).
Color and properties: Dark brown liquid.
Soluble in alcohol.
Derivation: Alcoholic solution of tannin to which iodine is added.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Iodotannin. See Iodotannic acid.

Iodothymol. See Thymol iodide.

Iodotriferrin. An iodized iron para-nucleate containing 8.5% iodine and 15% iron. Used in medicine as a means of administering iodine internally. Unofficial.
Railroad shipping regulations: None.*

Iodozol. Diïodo-para-phenolsulfonic acid used in medicine as an iodoform substitute. Unofficial.
Railroad shipping regulations: None.*

Iodum, U.S.P. See Iodine.

Ioduretted Oil. See Iodized oil.

Iodyloform. Iodized gelatin containing 10% iodine Used in medicine as a means of administering iodine internally. Unofficial.
Railroad shipping regulations: None.*

Iodyrite. See Iodargyrite.

Iolite (Dichroite or Cordierite) $H_2(MgFe)_4Al_8Si_{10}O_{37}$ or $H_2O.4(MgFe)O.4Al_2O_3.10SiO_2$.
A natural magnesium-aluminum silicate of uncertain formula, containing a small amount of calcium and with some ferrous iron replacing magnesium. Color, gray, violet, yellow, various shades of blue, vitreous luster; white streak.
Constants: Sp.gr. 2.6 to 2.66; hardness 7 to 7.5.
Occurrence: United States (Connecticut, New Hampshire), Bavaria, Finland, Sweden, Switzerland, Brazil, Ceylon, Madagascar, Greenland.
Uses: Sometimes used as a gem stone.

Iosol. See Thymol iodide.

Iothion. 1:3-diïodopropane-2-ol used in medicine as an iodoform substitute. Unofficial.
Railroad shipping regulations: None.*

Iothymol. See Thymol iodide.

Ipado. See Coca.

Ipecac (Ipecacuanha; Cephaelis; Uraqoqa).
Dried root of Cephaelis ipecacuanna.
Habitat: Brazil and Bolivia; cultivated in India.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Medicine (emetic and expectorant); tanning agent; manufacture of sweetmeats.
Railroad shipping regulations: None.*

Ipecacuanha, U.S.P. See Ipecac.

Ipomea. See Jalap, orizaba.

Ipomea Resin. See Scammony resin.

Iridium Ir.
Color and properties: Silvery metal. Heaviest of all metals.
Constants: Sp.gr.: (a) White spongy, 15.86; (b) Crystalline, 22.42. M.p.: (a) White spongy, 2,250°C.; (b) Crystalline, 1,950°C.
(a) Soluble in acids. (b) Insoluble in aqua regia and other acids.
Derivation: Separated from platinum by dissolving native platinum or its ores in aqua regia, iridium being insoluble.
Impurities: Palladium; platinum; osmium.
Grades: Technical.
Containers: Boxes.
Uses: Alloys; points on gold pens.
Railroad shipping regulations: None.*

Iridosmine (Osmiridium). A natural alloy of iridium and osmium containing some platinum, rhodium, ruthenium, iron, copper, palladium. Tin-white to light steel gray in color; streak, same; metallic luster. Composition is variable ranging from 10.0 to 77.2% Ir, 17.2 to 80.0% Os, 0 to 10.1% Pt, 0 to 17.2% Rh, 0 to 8.9% Ru, 0 to 1.5% Fe, 0 to 0.9% Cu, tr. Pd. Unattacked by aqua regia.
See also Nevyanskite and Sysertskite.
Constants: Sp.gr. 18.8 to 21.12; hardness 6 to 7.
Occurrence: United States (California, Oregon), Russia, Japan, Borneo, Australia, Tasmania, New Zealand, Canada, West Indies, Brazil, South Africa.
Uses: Very hard and resistant to corrosion. Fountain pen point tips; surgical needles; watch pivots; compass bearings; hardening platinum (standard weights, jewelry); source of iridium and osmium.

Iriphan. See Strontium-alpha-phenylcinchoninate.

Iris. See Orris.

Iris Versicolor (Blue flag).
Dried rhizome of Iris versicolor.
Habitat: United States.
Grades: N.F.
Uses: Medicine (cathartic and emetic).

Irish Broom. See Scoparius.

Irish Moss (Chondrus; Sea moss).
Derivation: A kelp found along coast of Ireland and New England.
Grades: Technical.
Containers: Burlap bags.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Chemicals (clarifying agent in precipitating finely suspended matter; medicine; leather dressing; textiles (thickening agent added to dyes used in printing fabrics, sizing); foods; special soaps; decorating book covers.
Railroad shipping regulations: None.*

Iron Acetate. See Ferric acetate.

Iron Acetate, Basic. See Ferric acetate, basic.

Iron Acetate Liquor (Iron liquor; Black liquor; Black mordant; Iron pyrolignite).
Color and properties: Intensely black liquor, sometimes containing copperas or tannin. Absorbs oxygen from the air.
Constants: Sp.gr. 1.120 to 1.140.
Derivation: By the action of pyroligneous acid on iron filings.
Grades: Technical; 25°Tw.
Containers: Wooden barrels.
Uses: Calico-printing; dyeing; producing black color on hats, furs, leather, wood.
Railroad shipping regulations: None.*

Iron Albuminate. See Iron albuminized.

Iron, Albuminized (Iron albuminate; Ferric albuminate).
Color and properties: Reddish-brown granules or powder.
Derivation: Compound of iron oxide and albumin, rendered soluble by the presence of sodium citrate.
Grades: N.F.
Uses: Medicine (chalybeate).

Iron Alum. See Ferric-potassium sulfate.

Iron-ammonium Citrate. See Ferric-ammonium citrate.

Iron-ammonium Oxalate. See Ferric-ammonium oxalate.

Iron-ammonium Sulfate. See Ferric-ammonium sulfate and Ferrous-ammonium sulfate.

Iron and Steel (Ferrum) Fe.
Color and properties: Silvery-white, tenacious, lustrous, malleable, ductile metal, rarely found native except in basalts and meteorites. The only metal which can be tempered, i.e., hardened by heating and sudden cooling; heating and slow cooling make it very pliable. It is magnetic and can be magnetized, but soon loses its magnetism (steel retains it). It rapidly oxidizes (rusts) in damp or salty air. Water is decomposed by iron at all temperatures from 0° to 100°C., yielding hydrogen. It is very brittle at very low temperatures, softens at red-heat and can be welded at white-heat.
Constants: (a) Pure iron: Sp.gr. 7.85 to 7.88; m.p. 1,530°C.; b.p. 2,450°C. (b) Wrought-iron: Sp.gr. 7.80; m.p. 1,600°C. (c) White pig-iron: Sp.gr. 7.58 to 7.73; m.p. 1,075°C. (d) Gray pig-iron: Sp.gr. 7.03 to 7.13; m.p. 1,275°C. (e) Steel: Sp.gr. 7.60 to 7.80; m.p. 1,375°C.
Soluble in dilute acids; insoluble in water, alcohol, ether and alkalis.
Corrosion resistance: See under Armco ingot iron and Genuine wrought iron.
Derivation: By smelting the ores (hematite, limonite, magnetite, siderite, most generally used) with carbon (coke, charcoal or coal) in blast or electric furnaces, yielding iron with combined and free carbon in solution. The proportion and condition of the carbon and amount of included slag determine the properties of the resulting metal and yield cast-iron, wrought-iron or steel. The iron is run into molds (pig machines) or sent molten in ladles to the steel plant. The pig iron is converted into wrought-iron by burning out the carbon, silicon, manganese, phosphorus and sulfur present in reverberatory furnaces. Steel is produced (a) By Bessemerizing (oxidizing by means of an air-blast in a "converter"). (b) By the open-hearth process (refining in a regenerative-reverberatory furnace). (c) By the crucible process in which wrought-iron, steel scrap, or a mixture of both are melted in graphite or clay crucibles with charcoal. (d) By the cementation process in which bars of wrought-iron are imbedded in charcoal at 950° to 1,000°C. until carbon has penetrated to center of bar. (e) By the duplex process in which pig iron of medium high phosphorus content is partially purified in an acid Bessemer converter, then transferred to a basic open hearth where the purification is completed and the metal converted into steel. (f) By the electric process. In this country the raw materials are usually steel scrap or molten metal purified by the acid Bessemer or the basic open hearth process, but pig iron or pig iron and scrap may be used. Heat generated electrically keeps the charge molted while it is being purified with oxidizing and reducing slags, and during the additions necessary to control the composition. The Bessemer and open-hearth processes produce mild (low carbon) steel.

Steels classified according to composition: †

I. Plain Steels: Steels in which the only solid elements are iron, carbon, manganese, silicon, phosphorus and sulfur.

1. Ingot Iron: Highly refined steel made in the basic open hearth furnace, consisting of almost pure iron and containing a maximum of 0.15% total impurities.
2. Simple Carbon Steels: Steels in which carbon is the only element employed to control physical properties, but they may contain some manganese (less than 1%), with a minimum of other impurities. They may be divided into two main classes.

(a) Hypoeutectoid Steels—Steels containing less than 0.85% carbon. These steels may be and are roughly divided as follows:

i. Dead Soft Steels: Made in the basic open hearth and contains less than 0.10% carbon and from 0.20 to 0.50% manganese.

ii. Low Carbon Steels: Contain from 0.10 to 0.30% carbon and less than 0.60% manganese. May be made by the Bessemer, the open hearth, the duplex, or the electric process.

iii. Medium Carbon Steels: Contain from 0.30 to 0.85% carbon and less than 1.00 % manganese. May be made by any of the processes mentioned under ii or by the crucible process.

(b) Hypereutectoid or High Carbon Steels: Steels containing more than 0.85% carbon. These steels seldom contain more than 1.50% carbon nor more than 0.40% manganese. They are made by the crucible, open hearth and electric processes.

II. Alloy-treated Steels: Carbon steels to which some other element or elements are added to improve their quality, but without changing markedly their characteristics. They are generally of the low carbon and medium carbon types, and are usually made by the open hearth, Bessemer, or electric processes. The elments that may be added for this purpose, in addition to manganese, are small amounts of aluminum, silicon, titanium, copper, phosphorus, sulfur, chromium, molybdenum, vanadium and tungsten.

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† This classification is taken from Camp and Francis, "The Making, Shaping and Treating of Steel," Pittsburgh, Carnegie Steel Co., 1925.

* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

III. Alloy Steels: Steels, which, in addition to carbon, contain another element or other elements in sufficient amounts to modify the properties to a marked degree over the carbon steel. They may be divided into the following groups:

(a) Simple Alloy or Ternary Steels: Steels that contain but one other alloying element in addition to carbon.

1. Low Manganese Steel—Steels containing over 1.00% and less than 7.00% manganese, made by the acid or the basic open hearth or the electric process. Used as structural steels for machines and for some tools.
2. Manganese Steel—Steels containing more than 7% manganese. Made by acid open hearth or electric processes, used in railroad crossings, frogs, switches, etc.
3. Silicon Steel—Steels containing from 0.50 to 4.50% silicon. Made by basic open hearth or electric processes, used in electric machines and apparatus.
4. Nickel Steel—Steels containing more than 0.5% nickel, usually made by basic open hearth process. Used mainly as structural steels.
5. Chrome Steels—Made by basic open hearth or electric processes, but can also be made by crucible process. Used in forging steels, for tools and other special purposes. The chromium content is usually over 0.50%.
6. Molybdenum Steels—Made mainly by the basic open hearth process. Used occasionally in structural steels and parts of machinery. The molybdenum content is between 0.40 and 1.00%.
7. Vanadium Steels—Made mainly by basic open hearth and electric processes, and also by the crucible processes. Used in fine steels for tools and machinery. The vanadium content in structural steels is generally 0.15 to 0.25%.
8. Tungsten Steel—Made mainly by electric process, but can also be made by crucible process. Used mainly for magnets. Tungsten content 3 to 7%.

(b) Quarternary Steels: Steels that contain two alloying elements in addition to carbon. The chief representatives are:

1. Chrome-nickel Steels—Mainly structural steels made by basic open hearth process.
2. Chrome-vanadium Steels—Used mainly for fine forgings and parts of machines. Made by basic open hearth and electric processes.
3. Chrome-molybdenum—Fine structural steels for parts of machines. Made by basic open hearth and electric processes.

(c) Complex Alloy Steels: Steels that contain more than two alloying elements in addition to carbon. These steels are generally high-grade, high-priced steels designed for certain special purposes, and include a great many varieties. The chief representatives, however, are the high speed steels, which are chrome-tungsten-vanadium, or chrome-tungsten-vanadium-cobalt steels for tools.

Steels classified according to use: † In former times the different varieties of steel were largely classified by use, but its uses have now been extended to so many fields and the varieties have increased to such an extent that such a classification is now well nigh impossible. However, this custom survives to some extent, so that an understanding of the significance of some of the terms most commonly met with is desirable. Among these may be mentioned the following:

1. Structural Steel: Used in the fabrication of buildings, bridges, ships, cars, and other structures, mainly low carbon steels, but includes many varieties of alloy-treated and alloy steels. Made chiefly by the open hearth process.
2. Tool Steel: Any steel adapted to the manufacture of hand or machine tools. Many varieties, including medium and high carbon plain steels and many classes of alloy steels. Made mainly by the crucible and electric processes, but common grades are also made by the open hearth process.
3. Spring Steel: Any steel suitable for the manufacture of springs, such as those used on cars, carriages, automobiles, etc. Includes medium and high carbon plain steels, and quarternary alloy steels. Made by open hearth and electric processes.
4. Boiler Steel: A high-grade low carbon steel especially adapted for use in making boilers. Made by the open hearth processes.
5. Rail Steel: Any steel suitable for railroad rails. Usually 0.60 to 0.85% carbon steel made by the basic open hearth process, but some rails are still made by the Bessemer process, in which case the carbon ranges from 0.30 to 0.60% in different grades.
6. Pipe Steel, Skelp Steel, or Welding Steel: A dead soft or low carbon plain steel especially suitable for welding. Made by the Bessemer and open hearth processes.
7. Sheet Bar and Tin Bar; any steel suitable for rolling into sheets. Mainly low carbon steels made by the basic open hearth or the Bessemer process, but some is also made by the acid open hearth process.
8. Case Hardening Steel: Any steel that can be carbonized or case-hardened readily. Low carbon plain steels or ternary or quarternary alloy steels. Made mainly by the basic open hearth process, but some grades are made by the electric process.
9. Electrical Steel: Usually silicon steels used in the manufacture of electrical machines and apparatus.
10. Strip Steel: Any steel rolled into the form of strips. May be hot finished (hot rolled strip) or cold finished (cold rolled strip). Made mainly by open hearth process.
11. Hoop Iron: Low carbon steel in strip form suitable for hoops. Made by basic open hearth or Bessemer processes.
12. Free Cutting Steel: Steel for bolts, nuts, screws, etc., that machines readily. Made by Bessemer or open hearth processes.
13. Forging Steel: Steel especially suitable for forging, that is, hammering or pressing. Usually medium carbon plain steel or quarternary alloy steels. Made by basic open hearth or electric processes.
14. Cast Steel: A term used in connection with any article of steel formed by casting.
15. Forged Steel: A term applied to articles of steel formed by hammering or pressing.
16. Wrought Steel: A term used in connection with any article of steel formed by forging or hot rolling, or by hot working in any way.

Iron Arsenate. See Ferrous arsenate.

Iron Benzoate. See Ferric benzoate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Iron Black.
Color and properties: Fine black powder.
Derivation: By the action of zinc upon an acid solution of an antimony salt, a black antimony being precipitated as a fine powder.
Uses: Imparting the appearance of polished steel to papier maché and plaster of Paris.
Railroad shipping regulations: None.*

Iron Blues.
Various blue pigments consisting of the ferrocyanide of iron (ferric ferrocyanide) of which Prussian blue is the best known. There are many varieties which are made by slightly different processes and sold under the names steel blue, bronze blue, etc., but such names are now somewhat misleading due to the fact that some have come to be used more or less interchangeably while others have become obsolete. Thus, the names have somewhat lost their original significance which identified certain characteristics.
Prussian blue is made by precipitating a solution of a ferrous salt with potassium or sodium ferrocyanide, washing the white precipitate of ferrous ferrocyanide formed and oxidising with sulfuric acid and nitric acid or with ferric sulfate, or with ferric chloride, or with chlorine, or with potassium bichromate and sulfuric acid, or with potassium chlorate and hydrochloric acid. When oxidation is complete, wash with water until neutral and dry at a moderate temperature.
Soluble Prussian blue is made by precipitating a ferric salt with potassium or sodium ferrocyanide or by pressing Prussian blue to a firm pulp and working in oxalic acid or ammonium oxalate. The pulp becomes runny and is then dried on lead or lead-lined pans.
Turnbull's blue is made by precipitating a ferrous salt with potassium ferricyanide instead of the ferrocyanide.
Prussian blue has a dark overtone and reddish undertone. Bronze, Chinese and steel blues are bronze blues with a greenish undertone. Milori blue is either the same as "bronze," or perhaps with less bronze, being between bronze and bronzeless. New Blue is about the same as bronzeless, having a very black toptone and greenish undertone. Antwerp blue and mineral blue also lack bronze, but have a paler toptone and usually contain 25 to 35% extender, such as aluminum hydrate or blanc fixe.
Paris blue and Berlin blue are used as synonyms for Prussian blue, though they are sometimes reduced.
The term Berlin blue although it appears in the U. S. Tariff law and in the classifications of the Department of Commerce is practically obsolete at the present time. Paris blue is also listed as a triphenylmethane blue, similar to Bavarian or quinoline blue. It is probable that Paris blue is similar to night blue, which is a bronze blue reduced and toned up with patent blue. Celestial blue is a Prussian blue reduced with 80 to 90% barytes. Brunswick blue is like celestial blue or stronger. Saxon blue is more properly a cobalt blue.
Other names are: Erlanger blue, foxglove blue, Hamburg blue, laundry blue, washing blue, Williamson's blue.
Uses: Blue-headed matches; blue ink; laundry blue; paint pigment; dyeing; coloring soap and paper; ingredient of fertilizer mixtures.
Railroad shipping regulations: None.*
Note: Due to the promiscuous use of the nomenclature of these blues, manufacturers prefer to duplicate to sample rather than to supply a blue of a definite name.

Iron Bromide. See Ferric bromide and Ferrous bromide.

Iron Buff (Nankin yellow). Ferric hydroxide dyed on cotton or cotton goods by steeping the latter in a solution of ferrous sulfate, basic ferric sulfate or ferric nitrate and precipitating the hydroxide on the fiber by means of calcium hydroxide solution, sodium hydroxide solution or soda ash.

Iron Carbonate. See Ferrous carbonate.

Iron Carbonate, Precipitated. See Ferric oxide, brown.

Iron Carbonyl. See Iron pentacarbonyl and Iron tetracarbonyl.

Iron Cements. See under Cements, structural.

Iron Chloride. See Ferric chloride and ferrous chloride.

Iron Chloride-antipyrine. See Ferropyrine.

Iron Chromate. See Ferric chromate.

Iron Citrate. See Ferric citrate.

Iron "Cyanide." See Ferric ferrocyanide.

Iron Dichloride. See Ferrous chloride.

Iron Dichromate. See Ferric bichromate.

Iron Earth, Blue. See Vivianite.

Iron Ethiops. See Ferric oxide, black.

Iron Ferrocyanide. See Ferric ferrocyanide.

Iron Fluoride. See Ferrous fluoride.

Iron Froth, Red. See Hematite, red.

Iron Gallotannate. See Ferric tannate.

Iron, Galvanized. See Galvanized iron.

Iron Glance. Specular iron ore. See Hematite, red.

Iron Glycerinophosphate. See Iron Glycerophosphate.

Iron Glycerophosphate (Iron glycerinophosphate).
Derivation: By the interaction of a soluble ferric salt and glycerophosphoric acid.
Color and properties: Yellowish scales.
Soluble in water, alcohol and syrups.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Iron Hydrate. See Ferric hydrate.

Iron Hydroxide. See Ferric hydroxide.

Iron Hypophosphite. See Ferric hypophosphite.

Iron Iodide. See Ferrous iodide.

Iron Liquor. See Iron acetate liquor.

Iron Malate. See Ferric malate.

Iron Minium. A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Iron Molybdate, Native. See Molybdite.

Iron Nitrate. See Ferric nitrate.

Iron Oleate. See Ferric oleate.

Iron Ore, Blue. See Vivianite.

Iron Ore, Bog. See Limonite.

Iron Ore, Brown. See Limonite.

Iron Ore Cement. See under Cements, structural.

Iron Ore, Chrome. See Chromite.

Iron Ore, Kidney. Red hematite (q.v.) exhibiting a fibrous or columnar structure and a nodular surface.

Iron Ore, Magnetic. See Magnetite.

Iron Ore, Micaceous. See Hematite, micaceous.

Iron Ore, Pea. See Iron ore, bog.

Iron Ore, Red. See Hematite, red.

Iron Ore, Spathic. See Siderite.

Iron Ore, Specular. See Hematite, red.

Iron Ore, Titanic. See Ilmenite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Iron Oxalate. See Ferrous oxalate.

Iron Oxide, Black. See Ferric oxide, black.

Iron Oxide, Brown. See Ferric oxide, brown.

Iron Oxide, Hydrated. See Ferric hydroxide.

Iron Oxide, Magnetic. See Ferric oxide, black.

Iron Oxide, Red. See Ferric oxide, red.

Iron Oxide, Yellow. See Ferric oxide, yellow

Iron Pentacarbonyl $Fe(CO)_5$.
Color and properties: Viscid yellow liquid. Decomposes on exposure to air or to light.
Constants: Sp.gr. 1.466 at 18°C.; b.p. 102.8°C. (749 mm.).
Soluble in nickel tetracarbonyl and most organic solvents; insoluble in water.
Derivation: Ferrous oxalate is reduced by hydrogen and the finely divided iron produced is treated with carbon monoxide.
Railroad shipping regulations: None.*

Iron Peptonate. See Iron, peptonized.

Iron, Peptonized (Iron peptonate).
Color and properties: Dark brown granules or powder.
Derivation: Combination of iron oxide and peptone rendered soluble by the presence of sodium citrate.
Grades: N.F.
Uses: Medicine (non-astringent iron carrier).
Railroad shipping regulations: None.*

Iron Perchloride. See Ferric chloride.

Iron Peroxide, Hydrous. See Ferric hydroxide.

Iron Persulfate. See Ferric sulfate, basic.

Iron Phosphate. See Ferric phosphate.

Iron Phosphate, Saccharated. Ferrous phosphate, more or less oxidized, mixed with glucose; used in medicine for dyspepsia.

Iron-Portland Cement. See under Cements, structural, Eisen-Portland cement.

Iron-potassium Sulfate. See Ferric-potassium sulfate.

Iron-potassium Tartrate (Tartrated iron; Boules de Nancy; Chalybeated iron). $Fe_2(C_4H_4O_6)_3K_2C_4H_4O_6.H_2O$.
Color and properties: Thin, transparent scales; deep garnet color; sweetish taste; astringent; arsenic limit 5 parts per million.
Soluble in water, sparingly in alcohol.
Derivation: By submitting ferric oxide to the action of acid potassium tartrate for 24 hours. Gently heating the product, adding distilled water, filtering, evaporating slowly to a syrup and drying.
Containers: Glass bottles.
Uses: Medicine (ferruginous preparation for children).
Railroad shipping regulations: None.*

Iron Protocarbonate. See Ferrous Carbonate.

Iron Protochloride. See Ferrous chloride.

Iron Protoiodide. See Ferrous iodide.

Iron Protosulfide. See Ferrous sulfide.

Iron Pyrites. See Pyrite.

Iron Pyrites, White. See Marcasite.

Iron Pyrolignite. See Iron acetate liquor.

Iron Pyrophosphate $Fe_4(P_2O_7)_3$.
Color and properties: White powder.
Soluble in acids and carbonated water.
Derivation: By the addition of a ferric salt to a solution of pyrophosphoric acid.
Grades: Technical; N.F.
Containers: Glass bottles; 1 lb. cans.
Uses: Medicine.
Railroad shipping regulations: None.*

Iron-quinine Citrate. See Ferrous quinine citrate.

Iron Red. A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Iron, Reduced. See Ferrum reductum.

Iron Saffron. See Indian red.

Iron Salts. See Ferric and Ferrous.

Iron Scale. Consists of ferrous and ferric oxides in varying proportions. The inner layers are non-magnetic and the composition approximates $6FeO,Fe_2O_3$, the outer layers contain a higher proportion of ferrous oxide and ore magnetic.

Iron Scurf. A glazing material usually used for blue bricks. It consists of a mixture of stone and iron particles produced when gun barrels are ground by means of siliceous grindstones.

Iron Sesquibromide. See Ferric bromide.

Iron Sesquichloride. See Ferric chloride.

Iron Sesquioxide. See Ferric oxide, red.

Iron Sesquioxide, Hydrated. See Ferric hydroxide.

Iron Sesquisulfate. See Ferric sulfate.

Iron, Sherardized. See Sherardizing.

Iron-sodium Oxalate. See Ferric-sodium oxalate.

Iron Sponge. Iron oxide used for absorbing sulfur in the purification of coal gas.

Iron Stearate. See Ferric stearate.

"Iron Subcarbonate." See Ferric oxide, brown.

Iron Subsulfate. See Ferric sulfate, basic.

Iron Sulfate. See Ferric sulfate and Ferrous sulfate.

Iron Sulfate Basic. See Ferric sulfate, basic.

Iron Sulfide. See Ferrous sulfide.

Iron Sulfuret. See Ferrous sulfide.

Iron Tannate. See Ferric tannate.

Iron Tantalate. See Ferric tantalate.

Iron, Tartrated. See Iron-potassium tartrate.

Iron Tersulfate. See Ferric sulfate.

Iron Tetracarbonyl $Fe(CO)_4$.
Color and properties: Dark green, lustrous crystals. Decomposes to iron and carbon monoxide on heating to 140° to 150°C.
Constants: Sp.gr. 1.996 (18°C.).
Insoluble in water; soluble in most organic solvents.
Derivation: By heating a solution of diferron on a carbonyl in toluene in an atmosphere of carbon dioxide until the reddish-yellow solid has disappeared.
Railroad shipping regulations: None.*

Iron Tribromide. See Ferric bromide.

Iron Trichloride. See Ferric chloride.

Iron Trioxide. See Ferric oxide, red.

Iron Tungstate. See Ferric tungstate.

Iron Vanadate. See Ferric vanadate.

Iron Wine. Sherry wine in which iron wire has stood for some time, forming an iron-potassium tartrate. Used in medicine (unofficial) for its soluble iron content.
Railroad shipping regulations: None.*

Iron Wolframate. See Ferric tungstate.

Irone $C_{13}H_{20}O$.
Color and properties: Colorless oil, violet odor.
Constants: Sp.gr. 0.939 (20°C.), b.p. 144°C. (16 mm.).
Soluble in alcohol; insoluble in water.
Derivation: A ketone found in oil of orris.
Uses: Perfumery (artificial cassie).
Railroad shipping regulations: None.*

Ironstone, Clay. See Hematite, red.

Ironstone Clay, Brown. See Limonite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Isarol (Ichthyodin).

Color and properties: Thick brownish-red liquid. A proprietary form of ichthyol (q.v.).

Soluble in water, alcohol.

Uses: Medicine (see Ichthyol).

Railroad shipping regulations: None.*

Isatic Acid Anhydride. See Isatin.

Isatic Acid Lactime. See Isatin.

Isatin (Orthoaminophenylglyoxalic lactime; Orthoaminobenzoylformic acid; Isatic acid, anhydride; Isatic acid lactime) $C_6H_4COC(OH)N$.

Color and properties: Yellowish-red crystals; bitter taste.

Constants: M.p. 200°C.

Soluble in water, alcohol and ether.

Derivation: From indigo by oxidation.

Grades: Technical.

Containers: Wooden kegs.

Uses: Dyestuffs.

Railroad shipping regulations: None.*

Isinglass, Bengal. See Agar-agar.

Isinglass, Ceylon. See Agar-agar.

Isinglass, Chinese. See Agar-agar.

Isinglass, Japanese. See Agar-agar.

Isoamyl Acetate. See Amyl acetate.

Isoamyl Alcohol (Isobutylcarbinol; Primary isoamyl alcohol) $(CH_3)_2CHCH_2CH_2OH$.

Color and properties: Clear, colorless liquid; cough-provoking odor.

Constants: Sp.gr. 0.823; b.p. 131°C.; m.p. —117.2°C.; freezing point —134°C.; weight per gal. 6.76 lbs.

Soluble in water, alcohol and ether.

Derivation: (1) By fractional distillation of fusel oil. (2) By fractional distillation of pentasol (q.v.).

Grades: Technical; C.P.

Containers: 1, 5 lb. bottles; 25 lb. cans; 1, 5, 10, 50, 100 gal. drums.

Uses: Solvent.

Railroad shipping regulations: None.*

Isoamyl Alcohol, Primary. See Isoamyl alcohol.

Isoamyl Butyrate $C_5H_{11}COOC_3H_7$.

Color and properties: Practically water white.

Constants: Sp.gr. 0.866 to 0.868 (15.5°C.); boiling range 150° to 180°C.

Soluble in alcohol and ether; very slightly soluble in water.

Derivation: By treating isoamyl alcohol with butyric acid.

Method of purification: Distillation.

Grades: Commercial 95 to 100% ester content.

Containers: Glass carboys; tin-lined drums.

Uses: Flavoring extracts.

Fire hazard: Inflammable.*

Railroad shipping regulations: None(?)*

Isoamylene, Beta-. See Amylene.

Isoamyl Formate $C_5H_{11}COOH$.

Color and properties: Practically water white.

Constants: Sp.gr. (15.5°C.) 0.877; boiling range 117° to 124°C.

Soluble in alcohol, ether; very slightly soluble in water.

Derivation: By treating isoamyl alcohol with formic acid.

Method of purification: Distillation.

Grades: Commercial 85 to 90% ester content.

Containers: Glass carboys; tin-lined drums.

Uses: Flavoring extracts.

Fire hazard: Inflammable.*

Railroad shipping regulations: Red label (see containers)(?)*

Isoamyl Isovaleriate. See Amyl valeriate.

Isoamyl Nitrite. See Amyl nitrite.

Isoamyl Salicylate $C_6H_4OHCOOC_5H_{11}$.

Color and properties: A water-white liquid sometimes having a faint yellow tinge which should not be pink or red. Has a flowery orchidee odor. Should not give a red ring when superimposed on a layer of sulfuric acid (indicating free amyl alcohol).

Constants: Sp.gr. 1.052; b.p. 280°C.

Insoluble in water; soluble in alcohol and ether.

Derivation: By esterifying salicylic acid with amyl alcohol. The ordinary article of commerce is the isoamyl ester.

Method of purification: Distillation.

Grades: A pure grade of at least 99% ester content which should not exceed 100% on analysis (indicating lower esters).

Containers: Carboys. Should not be shipped in tins or tinned drums as small amounts of exposed iron cause product to discolor badly.

Uses: As an ingredient in perfumes and in perfuming soap. Formerly used medicinally.

Railroad shipping regulations: None.*

Isobornylisovaleriate. See Gynoval.

Isobutyl Alcohol (Isopropylcarbinol) $(CH_3)_2CHCH_2OH$.

Color and properties: Clear, mobile liquid; inflammable.

Constants: Sp.gr. 0.806; b.p. 107°C.

Soluble in water, alcohol and ether.

Derivation: By the fractional distillation of crude fusel oil from potato alcohol.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles; barrels; iron drums.

Uses: Manufacturing fruit essences; organic synthesis.

Railroad shipping regulations: None.*

Isobutyl Aldehyde (Isobutyryl aldehyde) $(CH_3)_2CHCHO$.

Color and properties: Transparent, colorless, highly refractive liquid; pungent odor.

Constants: Sp.gr. 0.797; b.p. 63° to 64°C.

Soluble in alcohol; insoluble in water.

Derivation: By oxidizing isobutyl alcohol with chromic acid.

Method of purification: Distillation.

Grades: Technical.

Containers: Glass bottles; iron drums.

Uses: Organic synthesis.

Fire hazard: Dangerous(?)*

Railroad shipping regulations: Red label(?)*

Isobutylcarbinol. See Isoamyl alcohol.

Isobutylcarboxyl. See Valerianic acid.

Isobutylcinnamate. Colorless oil, amber fragrance used in perfumery.

Isobutyl-para-aminobenzoate. See Cycloform.

Isobutyraldehyde. See Isobutyl aldehyde.

Isobutyric Ether. See Ethyl isobutyrate.

Isobutyryl Aldehyde. See Isobutyl aldehyde.

Isocaproic Acid. See Butylacetic acid.

Isocyanuric Acid. See Cyanuric acid.

Isoëmodin. See Aloe-emodin.

Isoeugenol $C_{10}H_{12}O_2$.

Color and properties: Pale yellow oil.

Constants: Sp.gr. 1.0910 (15°C.); b.p. 268°C.

Soluble in alcohol, ether and other organic solvents; slightly soluble in water.

Derivation: From eugenol by isomerization with caustic potash.

Method of purification: Distillation.

Grades: Perfumers' grade.

Uses: Perfumes; vanillin.

Railroad shipping regulations: None.*

Isoform (Iodoanisole, para-) $C_6H_4(OCH_3)IO_2$.

Color and properties: White powder. Decomposes explosively if heated to 225°C.

Soluble in hot water, sparingly in cold water; insoluble in alcohol, ether.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Medicine (antiseptic in otitis media, skin diseases, urethritis, dressing for wounds, unofficial).
Railroad shipping regulations: None(?)*

Isohexoic Acid. See Butylacetic acid.

Isolenes. A proprietary name for purified rosins soluble in petroleum oils without crystallizing or separating. Said to be widely used for insulating purposes.

Isonandra Gutta. See Gutta-percha.

Isopentane. See Pentane.

Isopral (Trichloroisopropyl alcohol) $CCl_3CH(CH_3)OH$.
Color and properties: Microscopic prisms, camphorous odor, aromatic taste. Absorbed through skin, subcutaneous tissue and the digestive tract. More somnifacient than chloral hydrate but also more toxic.
Constants: M.p. 49°C.
Soluble in water, alcohol, ether.
Uses: Medicine (hypnotic, unofficial).
Railroad shipping regulations: None.*

Isoprene (Beta-methyldivinyl) $CH_2C(CH_3)CHCH_2$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.6989 (0°/0°), from turpentine 0.6768 (15°/15°), from rubber 0.6748; b.p. 33.5°C.
Derivation: (a) From rubber. (b) From turpentine. (c) From the vapors of dipentene.
Uses: Manufacture of synthetic rubber.
Railroad shipping regulations: None.*

Isopropanol. See Isopropyl alcohol.

Isopropyl Alcohol (Dimethylcarbinol; Pseudopropyl alcohol; Isopropanol) $(CH_3)_2CHOH$.
Color and properties: Colorless, clear, mobile liquid; inflammable.
Constants: Sp.gr. 0.80; b.p. 82.8°C.
Soluble in water, alcohol and ether.
Derivation: (a) By the reduction of acetone with sodium amalgam. (b) By treatment of propylene in oil gas with sulfuric acid and hydrolyzing.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: Tins; 55, 110 gal. drums.
Uses: Organic synthesis; medicine, manufacture of acetone.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Isopropylbenzene. See Cumene.

Isopropylbenzol. See Cumene.

Isopropylcarbinol. See Isobutyl alcohol.

Isopropyl Ether $(CH_3)_2CHOCH(CH_3)_2$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.7247 (20°/20°); b.p. 102.11 (760 mm.); m.p.: Less than —60°C.; weight per gal. 6.04 lbs.
Soluble in usual organic solvents.
Grades: Technical.
Containers: 1 gal. cans; 1, 5, 10, 55 gal. drums.
Uses: Solvent for animal, vegetable, mineral oils, waxes and resins; mixed with isopropanol may be used for de-waxing oils or de-oiling waxes; extraction of acetic acid from aqueous solutions; solvent for dyes in presence of small amount of alcohol.

Isopropyl-meta-cresol. See Thymol.

Isopropyl-ortho-cresol. See Carvacrol.

Isopropyltoluene. See Cymene.

Isopropyltoluol. See Cymene.

Isopurpurin. See Anthrapurpurin.

Isosafrole.
Color and properties: Colorless, fragrant liquid.
Derivation: Treatment of safrole with alcoholic potash.
Uses: Perfumery (heliotropin, soap).
Railroad shipping regulations: None.*

Isothiocyanallyl. See Allyl mustard oil.

Isovalerial. See Isovaleric aldehyde.

Isovaleric Acid. See Valerianic acid.

Isovaleric Aldehyde (Isovalerial; Valeraldehyde; Valeric aldehyde) $(CH_3)_2CHCH_2CHO$.
Color and properties: Colorless liquid; apple-like odor.
Constants: Sp.gr. 0.804; b.p. 92°C.
Soluble in alcohol and ether.
Derivation: By the oxidation of amyl acetate or the distillation of isovaleriates.
Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Flavoring compounds; perfumes.
Railroad shipping regulations: None(?)*

Isovaleryl-para-phenetidine (Sedatin; Valerydin) $C_2H_5OC_6H_4NHCOCH_2CH(CH_3)_2$.
Color and properties: White, glistening needles.
Almost insoluble in water and ether; soluble in alcohol and chloroform.
Derivation: By heating isovaleric acid with paraphenetidine.
Uses: Medicine (migraine hysteria, antineuralgic, succeedaneum for valeric acid, unofficial).
Railroad shipping regulations: None.*

Isoxylene. See Xylenes.

Isoxylol. See Xylenes.

Ispaghula (Spogel seeds).
Dried seeds of Plantago ovata.
Grades: Technical.
Containers: Bags.
Uses: Medicine (demulcent).
Railroad shipping regulations: None.*

Istizine.
Color and properties: Orange-yellow crystalline powder. A synthetic dihydroxyanthraquinone.
Soluble in alkaline solutions; difficultly soluble in water and usual organic solvents.
Uses: Medicine (synthetic cathartic, unofficial).
Railroad shipping regulations: None.*

Italian Earth. The same as Terra di Siena (q.v.).

Italian Red. A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Itrol (Silver citrate) $Ag_3C_6H_5O_7$.
Color and properties: Odorless, heavy powder, containing not less than 62% silver. Moderately light-sensitive. A powerful, non-irritating antiseptic. Decomposed by organic matter.
Almost insoluble in water.
Uses: Medicine (astringent, antiseptic, inflammation of mucous membrane, urethritis, gonorrheal ophthalmia, trachoma, cystitis, wound-dusting powder, unofficial).
Railroad shipping regulations: None.*

Iva Oil.
Color and properties: Bluish-green liquid oils; aromatic odor.
Constants: Sp.gr. 0.934.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the flowering herb of Achillea moschata.
Method of purification: Rectification.
Grades: Technical.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Glass bottles; iron drums.
Uses: Preparation of Swiss iva liqueur.
Railroad shipping regulations: None.*

Ivory. A hard, white, close-grained substance which constitutes the greater part of the tusks of the elephant, mammoth, hippopotamus, narwhal and walrus. The best grades are those obtained from the elephant.

Ivory, Artificial. A substance resembling natural ivory made by mixing gypsum and stearic acid.

Ivory Black. See under Blacks.

Ivory Drop Black. See under Blacks, Animal black.

Ivory, Vegetable. The fruit of Phytelephas macrocarpa found in Colombia, South America.

Ivy, Climbing. See Rhus toxicodendron.

Ivy Gum. See Hedera gum.

Ivy, Poison. See Rhus toxicodendron.

Ivy, Three-leaved. See Rhus toxicodendron.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

J

J Acid. See 2-Amino-5-naphthol-7-sulfonic acid.

J Acid Urea. See 5:5-Dihydroxy-7:7-disulfonic-2:2-dinaphthylurea.

Jaborandi. See Pilocarpus.

Jaborandi Oil.
Color and properties: Bright yellow liquid; penetrating odor.
Chief known constituents: Pilocarpene; ketones.
Constants: Sp.gr. 0.865 to 0.895; b.p. 180° to 290°C.; optical rotation +3° 25′.
Soluble in alcohol and ether.
Derivation: Distilled from the leaves of Pilocarpus pennatifolius.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; hair tonics.
Railroad shipping regulations: None.*

Jacquemart's Reagent. A reagent used in analytical work as a test for ethyl alcohol. It consists of an aqueous solution of mercuric nitrate with nitric acid. On heating the liquid with the reagent, the mercury salt is partially reduced and if ethyl alcohol is present, yields a black precipitate on the addition of ammonia water. Methyl alcohol does not produce this reaction.

Jade (Jadeite; Nephrite). A hard and extremely tough material of varying composition, greenish-white to deep green in color. Part of the so-called jade is jadeite, a variety of pyroxene, essentially a meta-silicate of sodium and aluminum. Part is nephrite, a variety of amphibole, and essentially a meta-silicate of iron, lime and magnesium; and part is a variety of saussurite, which is commonly a complex alteration product of plagioclase feldspar. Williamsite, a variety of serpentine, is sometimes mistaken for jade.
Occurrence: United States (Massachusetts), China, New Zealand, Philippines.
Uses: Carved ornaments.

Jadeite. See Jade.

Jaft. See Dchit.

"Jaggary" Sugar. A low-grade crude sugar produced in India from the date palm.

Jalap.
Dried tuberous root of Exogonium jalapa.
Habitat: Mexico; cultivated in India.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (active cathartic).
Railroad shipping regulations: None.*

Jalap, Orizaba (Mexican scammony root; Ipomea).
Derivation: Dried root of Ipomoea orizabensis.
Grades: U.S.P.
Containers: Bags.
Uses: Medicine (purgative).
Railroad shipping regulations: None.*

Jalap Resin. A mixture of resins obtained by alcoholic extraction of Jalap. Used in medicine as a cathartic. Also used as a substitute for scammony resin due to the scarcity of the latter.

Jamaica Kino. See West Indian kino.

Jamaica Pepper. See Pimenta.

Jamesonite (Feather ore) $Pb_2Sb_2S_5$.
Steel-gray to dark-gray secondary mineral of metallic luster. Contains 50.8% lead, 29.5% antimony, balance sulfur. Soluble in hot hydrochloric acid.
Constants: Sp.gr. 5.5 to 6; hardness 2 to 3.
Occurrence: United States (Arkansas), Mexico, Germany.

Jamestown Weed. See Stramonium.

Japaconitine. See Aconite.

Japan (Japan lacquer).
Derivation: A lacquer or varnish prepared by heating linseed oil with litharge and Prussian blue and thinning down the mixture with a solvent (naphtha, turpentine, etc.).
Grades: Technical.
Containers: Tin cans.
Uses: Lacquer for metal and wood; patent leather.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.
See also Lacquers, oriental.

Japan Agar. See Agar-agar.

Japan Camphor. See Camphor.

Japan Earth. See Catechu.

Japan Gelatin. See Agar-agar.

Japan Lacquer. See Japan.

Japan Tallow. See Japan wax.

Japan Wax (Japan tallow; Vegetable wax of Japan; Sumac wax).
Derivation: From a species of Rhus by boiling the fruit in water.
Color and properties: A pale yellow solid wax.
Constants: Sp.gr. 0.970 to 0.980; m.p. 53°C.
Soluble in benzene and naphtha.
Grades: Technical.
Containers: Wooden boxes.
Uses: Candles; wax matches; furniture polish; leather polishes; special soaps; substitute for beeswax.
Railroad shipping regulations: None.*

Japanese Acid Clay. See under Clays.

Japanese Belladonna. See Scopola.

Japanese Gelatin. See Agar-agar.

Japanese Isinglass. See Agar-agar.

Japanese Lacquers. See Lacquers, oriental.

Jargonelle Pear Essence. An alcoholic solution of amyl acetate used as a flavoring liquid.

Jasmal $(CH_2O)_2CHC_6H_5$.
The odoriferous principle of the jasmine flower.
Constants: Sp.gr. 1.334; b.p. 218°C.
Derivation: Synthetic, by condensation of phenylglycol and formaldehyde in presence of sulfuric acid.

Jasmine Oil.
Color and properties: Colorless, light yellow oil; characteristic odor.
Chief known constituents: Benzyl acetate, linalyl acetate, linalol and indole.
Constants: Sp.gr. 1.007 to 1.018; optical rotation +2.5° to 3.5°.
Soluble in alcohol, ether and chloroform.
Derivation: Alternate layers of the flowers of Spanish jasmine, Jasmium grandiflorum, and

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

cotton saturated with a fixed oil are exposed to the warmth of the sun in a closed vessel until the oil becomes impregnated, when it is expressed from the cotton.
Containers: Glass bottles; copper flasks.
Uses: Perfumery.
Railroad shipping regulations: None.*

Jasmine, Yellow. See Gelsemium.

Jasmone. A ketone found in jasmine oil, neroli and orange blossom, used in perfumery.

Jasp-agate. See Jasper.

Jasper (Jasp-agate; Jaspilite; Agate-jasper).
An impure, opaque form of quartz (q.v.) containing up to 20% impurities (iron oxide, iron hydroxide, clay, etc.). Usually red, yellow, dark-green or grayish-blue.
Varieties:
Egyptian jasper. Like brown flint, but with dark streaks and cloudings.
Striped, banded, riband jasper. Broad, colored stripes.
Porcelain jasper. Really a baked clay.
Agate-jasper (Jasp-agate). A gradation between jasper and agate.
Jaspilite. A ferruginous form of jasper used as an iron ore.
Essentially chert, hornstone and jasper are forms of compact Quartz.
Uses: Ornamental stone.

Jaspilite. See Quartz and Jasper.

Jateorhiza. See Calumba.

Jaulingite. A mineral resin from a variety of lignite; very inflammable.

Jaune Brilliant. See Cadmium sulfide.

Jaune d'Outremer. See Chrome yellows.

Java Pepper. See Cubeba.

Java Wax. See Fig-tree wax.

Javelle Water (Eau de Javelle).
Derivation: A solution of sodium hypochlorite, prepared by adding soda ash to a solution of calcium hypochlorite.
Containers: Glass bottles.
Grades: Technical.
Uses: Bleaching agent; disinfectant.
Railroad shipping regulations: None.*

Jaw Oil. See Black-fish oil.

"Jellitac." A trade name for a prepared starch-gluten sold in powder form, and forming an adhesive paste when stirred with cold water.

Jelutong. See Pontianak gum.

Jeppel's Oil. See Bone oil.

Jervine. An alkaloid present in veratrum used in medicine as a depressant. Unofficial.

Jessamine, Carolina. See Gelsemium.

Jesuits' Balsam. See Copaiba.

Jesuits' Bark. See Cinchona bark, calisaya.

Jet.
A dense black lignite which takes a good polish.
Occurrence: United States (Colorado), England, Germany, France, Spain.
Uses: Jewelry.

Jet Coal. See Cannel coal.

Jews' Pitch. See Asphalt.

Jimpson Weed. See Stramonium.

Jimson Weed. See Stramonium.

Joseëite (Telluric bismuth) $Bi_8Te_3S_2$.
Pale steel-gray mineral with gray streak, metallic luster. Contains 79.15% bismuth, 15.93% tellurium, 1.48% selenium, 3.15% sulfur. See also Tetradymite, Grünlingite, Wehrlite.
Constants: Sp.gr. 7.93; hardness 1.5 to 2.
Occurrence: Brazil.

Josephinite. A natural iron-nickel alloy, Fe_2Ni_5. Found in Oregon.

Judean Pitch. See Asphalt.

Juglans (Butternut bark; Oil nut; White walnut).
Dried inner bark of the root of Juglans cinerea.
Habitat: United States.
Grades: N.F.
Uses: Medicine (mild cathartic).

Juniper. See Juniperus.

Juniper Berry. See Juniperus.

Juniper-berry Oil (Jupiter oil).
Color and properties: Essential oil. Colorless or faintly greenish-yellow; becomes darker and thicker with age and exposure to air; characteristic somewhat turpentine-like odor; bitter, burning taste.
Chief known constituents: Pinene, cadinene, juniper camphor.
Constants: Sp.gr. 0.865 to 0.882 (normal oil, 0.867 to 0.875); optical rotation up to —11°; refractive index 1.479 to 1.484; acid value to 3.0; ester value 2 to 8, after acetylation 18 to 23.
Solubility in alcohol: 1 vol. in 5 to 10 vols. of 90% alcohol (usually clear solutions obtained only with freshly distilled oils).
Derivation: Distilled from the fruit of Juniperus communis, L.
Containers: 1, 5, 10 lb. bottles; 25 lb. tins.
Uses: Medicine; veterinary practice; preparation of gin and liqueurs.
Railroad shipping regulations: None.*

Juniper Gum. See Sandarac gum.

Juniper-wood Oil. Commercial samples of this oil now usually consist either of a juniper-berry oil diluted with turpentine oil or of a turpentine oil which has been distilled over juniper wood or twigs. Consequently they show considerable variation of properties. The properties given below are those of an oil stated to be genuine.
Constants: Sp.gr. 0.8692 at 15°C.; optical rotation —21° 2′; refractive index 1.47111; acid value 0.9; ester value, 6.7.
Solubility in alcohol: In 7 vols. and more of 90% alcohol (with slight turbidity).
Uses: Veterinary practice; medicine (external remedy).
Railroad shipping regulations: None.*

Juniperus (Juniper; Juniper berry).
Berries, wood and tops of Juniperus communis.
Habitat: Northern Europe, Asia and North America.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (treatment of cystitis, etc.); gin; cordials; fumigating; source of juniper oil.
Railroad shipping regulations: None.*

Jupiter Oil. See Juniper-berry oil.

Jute.
Derivation: The bast fiber of several species of Corchorus of which C. capsularis is the most important.
Habitat: India.
Grades: Technical.
Containers: Bales.
Uses: Bags; twine.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

K

"Kadox." Trade name for a colloidal zinc oxide specially developed for the rubber industry. It is also used to some extent in colored lacquers as a stabilizing agent.

Kaersutite. See Hornblend.

Kainite $MgSO_4.KCl.3H_2O$.

A natural hydrated double salt of potassium and magnesium found in the European potash deposits. Color, white, gray, reddish or colorless; streak, colorless; vitreous luster. Contains 30% potassium chloride.

Constants: Sp.gr. 2.05 to 2.13; hardness 2.5 to 3.

Occurrence: Germany, Galicia.

Uses: Chemicals (potassium salts); fertilizer (as such).

Kaiser Green. See Copper acetoarsenite.

Kakodylic Acid. See Cacodylic acid.

Kaladana (Pharbitis seeds).

Derivation: Dried seeds of Ipomoea hederacea.

Grades: Technical.

Containers: Bags.

Uses: Medicine.

Railroad shipping regulations: None.*

Kaladana Resin (Pharbitisin).

A mixture of resins obtained from Kaladana. Soluble in alcohol.

Grades: Technical.

Containers: Bags.

Uses: Medicine (cathartic).

Railroad shipping regulations: None.*

Kaliammonsalpeter.

A proprietary brand of concentrated fertilizer developed in Germany. It is said to consist of a mixture of potassium chloride, ammonium nitrate, potassium nitrate and ammonium chloride secured as the product of an incomplete double-decomposition reaction between potassium chloride and ammonium nitrate.

Railroad shipping regulations: None.*

Kalinite $KAl(SO_4)_2.12H_2O$ or $K_2SO_4.Al_2(SO_4)_3.24H_2O$.

Native potash alum found either as a white efflorescence on shale or as a volcanic sublimation. Contains 9.9% K_2O, 10.8% Al_2O_3. The volcanic product contains traces of cesium and rubidium. Never found in large quantities.

Constants: Sp.gr. 1.75; hardness 2.5.

Occurrence: England, Italy.

Kalioalunite. See Alunite.

Kalium. See Potassium.

Kallilite.

$Ni(Sb,Bi)S$ or $NiS_2.Ni(Sb,Bi)_2$.

Light bluish-gray mineral found in Germany and not to be confused by similarity of nomenclature with kalinite (q.v.), the natural potash alum.

Kananga Oil. See Cananga oil.

Kaolin (China clay; White bole; Bolus alba; Argilla; Porcelain clay).

A white-burning clay which, due to its great purity, has a high fusion point and is the most refractory of all clays. Kaolins are of both domestic and foreign origin. The English product is stated to possess the following advantages over the domestic product: (a) dries very evenly, (b) will vitrify at a lower temperature, (c) shrinks less and the finished product is not so fragile. The domestic product, however, is much used. The deposits are located in: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Georgia, Florida, Indiana, Maryland, Minnesota, Missouri, Nevada, North Carolina, Pennsylvania, Virginia, West Virginia, Wisconsin and Wyoming. The most important are in Georgia, the Carolinas and Florida.

Analyses of some domestic Kaolins:

	1	2	3	4	5
Silica	45.74	46.97	45.61	46.35	44.99
Alumina	38.47	38.48	38.63	39.00	39.85
Iron oxides..	0.53	0.62	0.92	0.30	0.34
Titania	1.07	....	tr.	tr.	0.73
Lime	0.05	0.39	0.08	tr.	tr.
Magnesia ...	0.13	0.17	0.08	tr.	tr.
Soda	0.04	0.70	0.66	....	0.12
Potash	0.20		0.90	0.50	0.10
Ignition loss.	13.69	13.47	13.57	14.00	13.82

(1) Wilkinson County, Ga.
(2) Dillsboro, N. C.
(3) Mitchell County, N. C.
(4) Franklin, N. C.
(5) Mac Namee Mine, S. C.

See also Kaolinite, and Clayite.

Insoluble in water and dilute acids.

Grades: Technical, U.S.P.

Containers: 1, 5 lb. cartons; 90 lb. paper bags; bulk.

Uses: Ceramics (porcelain, whiteware, stoneware, floor and wall tile, electrical insulation, slips and glazes); color lakes; chemicals (manufacture of alum, aluminum sulfate); glass; leather (tanning and finishing); pencil leads (mixed with graphite); animal and vegetable oils and fats (clarifier); paint and varnish (pigment, filler); paper (filler); refractories; scouring soaps; textiles (filler and thickener).

Kaolin Cataplasm (Antiphlogistine; Denver mud).

Derivation: Said to be made by mixing of the following ingredients: Kaolin 577 parts; boric acid 45 parts; thymol 0.5 part; methyl salicylate 2 parts; peppermint oil 0.5 part; glycerol 375 parts.

Containers: Tins.

Uses: Medicine.

Railroad shipping regulations: None.*

Kaolinite $Al_2O_3.2SiO_2.2H_2O$.

A crystalline mineral of comparatively rare occurrence. It was formerly thought that all clays contained kaolinite as their clay base but this hypothesis has now been abandoned and the term is restricted entirely to the native mineral.

Occurrence: United States (Colorado), Wales, and a few other localities.

See also Clayite.

Kapazang Oil.

A fat derived from the seeds of Hodgsonia heteroclita.

Kapoc Oil. See Kapok oil.

Kapok Hair. The hair of the fruit of the kapok and bombax trees. It is unsuitable for textile purposes but is used for upholstering purposes and for filling lifebelts.

Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Kapok Oil (Kapoc oil).
Derivation: By pressing the seeds of Eriodendron anfractuosium and Bombax ceila.
Habitat: The tropics.
Color and properties: Yellowish-green oil; pleasant odor and taste.
Constants: Sp.gr. 0.9235; saponification number 181 to 205; iodine value 117 to 129.
Soluble in alcohol, ether and chloroform.
Grades: Technical.
Containers: Barrels.
Uses: Edible oil; soap stock.
Railroad shipping regulations: None.*

Karaya Gum.
One of the Bassora gums (q.v.).

Karite Oil. An oil derived from the seeds of Bassio paski.

Kataforite. See Hornblend.

Katchung Oil. See Peanut.

Katechu. See Catechu.

Kauri Gum. See Copal.

Kaurie. See Copal.

Kautschin. See Dipentene.

Kava.
The peeled, dried and divided rhizome and roots of Piper methysticum.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (genito-urinary diseases); raw material for intoxicating beverages in Sandwich Islands.
Railroad shipping regulations: None.*

Keene's Cement. See under Cements, structural.

Keilhauite. One of the rare earth minerals. It is a titanosilicate of calcium, aluminum, iron and the yttrium metals. Color, brownish-black.
Constants: Sp.gr. 3.52 to 3.77; hardness 6.5.
Occurrence: Norway.

Kelene. Trade name for a brand of ethyl chloride.

Kelp.
A large, coarse seaweed. Dried kelp contains from 2 to 4% ammonia, 1 to 2% phosphoric acid, 15 to 20% potash and traces of iodine.
Uses: Production of iodine, potash. During the war Californian kelp was harvested and made into fertilizer.
Railroad shipping regulations: None.*

Kerite. Artificial caoutchouc.

Kermes (Kermes berries; Scarlet corns; Grains of kermes; Alkermes). The dried females of the shield louse, Coccus ilicis. These insects contain a red dye which is the oldest coloring matter known. The coloring principle is considered to be kermesic acid, $C_{18}H_{12}O_9$.

Kermes Berries. See Kermes.

Kermesite (Pyrostibnite; Antimony blend; Pyroantimonite)
Sb_2S_2O or $2Sb_2S_3.Sb_2O_3$.
Cherry-red mineral with brownish-red streak and adamantine luster. Formed by the partial oxidation of stibnite (q.v.). Contains 75.0% antimony and 20% sulfur.
Constants: Sp.gr. 4.5 to 4.6; hardness 1 to 1.5.
Occurrence: Canada, Hungary, Germany, France.

Kerocaine. See Aminobenzoyldiethylaminoethanol hydrochloride, para-.

Kerosene. Kerosene oils are also known as burning oils, lamp oils and illuminating oils (q.v.).

Kesso Oil. See Valerian oil, Japanese.

Ketole. See Indole.

Ketone, Ethylmethyl. See Methylethylketone.

Ketone, Michler's. See Tetramethyldiaminobenzophenone.

Ketone Oils. See Acetone oil.

Ketopropane. See Acetone.

Kharsivan. See Arsphenamine.

Khus Khus Oil. See Vetivert oil.

Kidney Liverleaf. See Liverwort.

Kieropon. Trade name for a product used for preventing bleeding or mark-offs in bleaching vat-dyed cotton, rayon and linen goods with caustic soda.

Kieselguhr. See Diatomaceous earth.

Kieserite $MgSO_4.H_2O$.
A natural magnesium sulfate occurring in enormous quantities in the Stassfurt salt beds, Germany. Also found in Austria and India. See also Epsomite and Magnesium sulfate.

Killeen. See Chondrus.

Kimberlite. See Blue ground.

Kingle. Barren blaes (q.v.) occurring in Scottish oil-shale deposits. They are destitute of bituminous matter.

King's Blue. See Cobalt blue.

King's Green. See Copper acetoarsenite.

King's Yellow. See Orpiment (pigment).

Kinic Acid. See Quinic acid.

Kino (East India kino; Malabar kino, Madras kino; Cochin kino).
Color and properties: Unground, dark reddish-brown to reddish-black, small, brittle, angular fragments. Odorless; very astringent taste. Powdered, dark red angular fragments, glass-like, conchoidal surface, with the thinner pieces translucent and yellowish-red or brownish-red in color.
Derivation: Dried juice from the trunk of Pterocarpus marsupium, Roxburgh (Fam. Leguminosae).
Uses: Medicine (powerful astringent for diarrheas not attended with febrile excitement or inflammation, leucorrhea, passive hemorrhages).
Railroad shipping regulations: None.*
See also Eucalyptus kino, Australian kino, Botany Bay kino, African kino, Jamaica kino, West India kino, South American kino, Caraccas kino, Macaranga kino, Myristica kino.

Kish. (a) Impure graphite which separates from molten iron during the process of smelting in a blast furnace. (b) Dross on the surface of molten lead.

Kittool Fiber.
Derivation: From the leaves of a species of palm from Ceylon.
Grades: Technical.
Containers: Bags.
Uses: Brush manufacture.
Railroad shipping regulations: None.*

Kleinenberg's Fat Mixture. A solution of cacao-butter and spermaceti in castor oil, used as an imbedding material in microscopy.

Kleinite. A natural mercury ammonium chloride of uncertain formula. Found in Texas.

Klein's Reagent.
Derivation: A saturated solution of cadmium borotungstate.
$2(Cd_2H_2W_8O).7(WO_3)B_2O_3.H_2O$.
Constants: Sp.gr. 3.28.
Uses: For the separation of minerals by specific gravity.

Kliachite. Proposed name for bauxite (q.v.).

"Klucine." A proprietary waterproofing compound.

Knebelite. See Olivine.

"Knockout" Drops. See Chloral hydrate.

Knotted Marjoram. See Marjoram.

Kochelite. See Fergusonite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Koch's Acid. See 1-Naphthylamine-3:6:8-trisulfonic acid.

Koji. See Diastase, Taka.

Koksharovite. See Hornblend.

Kokum Butter (Concrete oil of mangosteen; Garcinia oil). A vegetable fat.
Derivation: From the seeds of Garcinia indica or Garcinia purpurea.

Kola. See Cola.

Kola Nuts. See Cola.

Kol-kol Gum. A gum derived from Acacia senegal.

Kola Seeds. See Cola.

Kondang Wax. See Fig-tree wax.

Konel. A ferrous alloy containing 73% nickel, 17.5% cobalt, 6.5% iron, 2.5% titanium and 0.2% manganese. It is used in moving parts of internal combustion engines and in radio filaments.

Kool. Mat bags, used in Russia for packing linseed for export.

Kooringa Fiber. A substitute for flax, prepared in Tanjore.

Kordofan Gum. See Arabic gum.

"Koreon." A proprietary brand of basic chromium sulfate, $Cr(OH)SO_4$, used in the tanning industry.

"Kosmos" Black. See under Blacks.

Kourbatoffs Reagents.
Four etching agents used in the micro-analysis of carbon steels.
A. A 4% solution of nitric acid in isoamyl alcohol.
B. A 20% solution of hydrochloric acid in isoamyl alcohol. To this is added one-third of its volume of a saturated solution of nitroaniline or nitrophenol in alcohol.
C. 1 pint of a 4% solution of nitric acid in acetic anhydride to which is added 1 part each of methyl alcohol, ethyl alcohol and isoamyl alcohol.
D. 3 parts of a saturated solution of nitrophenol added to 1 part of a 4% solution of nitric acid in ethyl alcohol.

Kousso (Cusso; Brayera).
Female inflorescence of flowers of the tree, Hagenia abyssinica.
Habitat: Abyssinia.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (vermifuge).

Kowrie Gum. See Copal.

Kraft Paper. See Paper pulp.

Krameria (Rhatany; Payta).
Dried root of Krameria triandra and Krameria argenta.
Habitat: Peru, Bolivia and Brazil.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (active astringent).
Railroad shipping regulations: None.*

Kremnitz White. See White, Cremnitz.

Krems White. See White, Cremnitz.

Kremser White. See White, Cremnitz.

Krennerite $(Au,Ag)Te_2$.
One of the gold-telluride group of minerals. Corresponds to the same general formula as sylvanite (q.v.), and calaverite (q.v.). Silver-white to pale yellow color.
Constants: Sp.gr. 8.35.
Occurrence: United States (Colorado), Transylvania.

Kreosal. See Creosote tannate.

Kreosote. See Creosotes.

Kresamin (Ethylenediamine tricresol).
A colorless liquid disinfectant consisting of a mixture of tricresol with ethylenediamine. Becomes light yellow on exposure to air, phenol odor.
Railroad shipping regulations: None.*

Kreso. A trade name for a cresol-soap disinfectant. Phenol coefficient, without organic matter 3.92, with organic matter 2.32.
Railroad shipping regulations: None.*

Kresol, Meta-, Ortho-, Para-. See corresponding cresol.

Kresolig. A trade name for a cresol-soap disinfectant. Phenol coefficient, without organic matter 2.18, with organic matter 1.48.
Railroad shipping regulations: None.*

Kresosolvin. See Creolin.

Kresotic Acid. See Cresotic acid.

Kryofin (Methoxyacetyl-para-phenetidine) $CH_3OCH_2CONHC_6H_4OC_2H_5$.
Color and properties: White needles, tasteless but becoming bitter on chewing. Dangerous to the feeble.
Constants: M.p. 98°C.
Soluble in alcohol, ether, chloroform, volatile oils; boiling water; much less so in cold water.
Derivation: By heating methylacetic acid and para-phenetidine.
Uses: Medicine (antipyretic), antineuralgic, unofficial).
Railroad shipping regulations: None.*

Kryolith. See Cryolite.

Krypton
Color: Colorless wholly inert gas—does not combine chemically with any element.
Liquefies at: —151.7° C.
Derivation: By fractional distillation of liquid air.
Grades: Highest purity.
Containers: Hermetically sealed glass flasks.
Uses: Filling electrical luminescent tubes.
Railroad shipping regulations: Green gas label.

Kunzite. See Spodumene.

Kuppfferite. See Hornblend.

Kuromoji Oil.
A Japanese essential oil having a coriander-like odor.
Chief known constituents: Linalol; geranyl acetate, terpineol; carvone; dipentene; limonene.
Constants: Sp.gr. 0.890 to 0.915; optical rotation —2° to —14°.
Solubility in alcohol: In 4 vols. of 70% alcohol.
Derivation: Distilled from the leaves and twigs of Lindera sericea.
Railroad shipping regulations: None.*

Kutch. See Catechu.

Kuteera Gum.
Color and properties: Inodorous yellowish-brown tears or irregular masses. Swells with water.
Derivation: Obtained from Sterculia urens which is a tree indigenous to southern Asia. Abundant in sub-Himalayan tracts eastward from the Ganges. Also in Persia. Sometimes found admixed with tragacanth gum when its presence may be disguised by the bleaching action of lead carbonate.
Uses: Filler and thickener in food products (ice cream).
Railroad shipping regulations: None.*

Kyanite. See Cyanite.

Kyapootic Oil. Cajuput oil (q.v.).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

L

L acid. See 1-Naphthol-5-sulfonic acid and 1-Naphthylamine-5-sulfonic acid.

Labarraque's Solution. An aqueous solution of chlorine compounds of soda containing not less than 2.5% NaOCl, equivalent to not less than 2.5% available chlorine. Used in medicine for disinfecting glass or chinaware sickroom utensils.

Grades: U.S.P.

Railroad shipping regulations: None.*

Labdanum Gum.

Hard, bitter, resinous substance obtained from various species of Cistus, small evergreen shrub inhabiting the islands of the Grecian archipelago and the Mediterranean countries.

Uses: Medicine (stimulant, expectorant); perfumery (fixative).

Railroad shipping regulations: None.*

Labordin. See Ethoxybenzoylaminoquinoline.

Labrador Tea Oil.

Color and properties: Greenish or reddish-colored viscous essential oil; penetrating, narcotic odor; pungent, unpleasant, persistent taste.

Chief known constituent: Ledum camphor.

Constants: Sp.gr. 0.93 to 0.96 at 15°C.

Derivation: By distillation of Ledum palustre, L.

Railroad shipping regulations: None.*

Labradorite. See Feldspar.

Lac (Lacca). See Shellac.

Lac Dye. A brilliant red dye obtained by maceration of crude lac. (See Shellac.)

Lac, Japanese. See Lacquers, oriental.

Lac Sulfur. See Sulfur, lac.

Lac Sulphuris. See Sulfur, lac.

Lac Vaccinum. Cow's milk.

Lac Wax. A wax obtained from lac (q.v.) consisting of myricyl and ceryl alcohols, free and combined with various fatty acids.

Railroad shipping regulations: None.*

Laccase. An oxidizing enzyme.

Lacmoid (Resorcinol blue)

$C_6H_3(OH)_2NOOHC_6H_3$.

Color and properties: Lustrous, dark-violet, crystalline scales.

Soluble in alcohol, ether, acetone, phenol and glacial acetic acid; slightly soluble in water.

Derivation: From resorcinol by treatment with sodium nitrite.

Method of purification: Crystallization.

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Indicator in analytical chemistry.

Railroad shipping regulations: None.*

Lacmus. Chemically pure litmus (q.v.).

Lacquers, Nitrocellulose. Protective coatings containing nitrocellulose. A lacquer enamel is a lacquer containing pigment. Lacquers came into prominence through the production of low viscosity cotton. In the production of nitrocellulose, cotton linters are nitrated and on the degree of nitration depends the use of the product. If the nitration is carried far enough gun cotton is produced, but nitrocellulose for most lacquer production is of ½-second viscosity and has a nitrogen content of 11.8 to 12.4%. A lacquer is composed of nitrocellulose, gums, plasticizers, pigment, solvents and diluents.

Solvents may be classified as follows:

(a) Low boilers—boiling below 100°C., used to reduce viscosity and promote rapid drying. Examples, acetone, ethyl acetate.

(b) Medium boilers—boiling between 100°C. and 150°C., used to produce the proper flow. Examples, butyl acetate, amyl acetate, cellosolve, diethyl carbonate, butyl propionate.

(c) High boilers—boiling between 150°C. and 170°C., also aid materially in the production of a proper flow; moreover, they aid in the production of a smooth, glossy film and prevent blushing from the imbibition of moisture. Examples, butyl cellosolve, cellosolve acetate, diacetone alcohol, ethyl lactate, ethyl oxybutyrate.

Diluents in nitrocellulose lacquers act as gum or resin solvents. They also serve to lower the cost of manufacture. While not directly a solvent for the nitrocellulose, the diluent should possess the property of becoming so with the addition of a minimum amount of active solvent. The hydrocarbon diluents used are benzene, toluene, xylene, and solvent naphtha. Among the alcohols are butanol, ethyl alcohol and fusel oil.

Plasticizers are used to render the lacquer film plastic and impermeable, the more common being high boiling esters, such as dibutyl phthalate and tricresyl phosphate.

Resins are added to the lacquer to give luster. Since they do not materially increase the viscosity even when present in large amounts, they can be used to give a more concentrated solution, thus increasing the thickness of the film. The choice of a resin depends upon the purpose for which the lacquer is intended. For example, where hardness combined with toughness is desired, gums like kauri and shellac are employed. For pale lacquers damar is used. Elemi gum imparts flexibility and adhesiveness. Where cheapness is the primary factor, ordinary gum or glycerol ester is used. If the content of the gum is too high the film will become brittle.

Pigments for outside work are added primarily to protect the nitrocellulose from the action of sunlight. Those which are chemically active should be used judiciously.

Lacquer is made as follows:

The nitrocellulose and the gum are dissolved separately in the solvent or solvents and clarified. When required, the two solutions are mixed and the plasticizer added. For the introduction of the pigment, a portion of the lacquer is ground with the pigment in pebble ball mills. The rest of the lacquer is then added and the final solution clarified by straining or centrifuging.

Grades: Dip; spray; brush.

Uses: Coating metals, wood, etc.

Railroad shipping regulations: Red label(?)*

Lacquers, Oriental.

These may be divided into three classes:

Burmese. A gray viscous liquid obtained from the stems of Melanorrhea usitata which on exposure to air becomes brown and then deep black.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Chinese. A grayish-white, milky juice obtained from a tree abundant in central China. The commercial lacquer is frequently adulterated with tung oil.
Japanese. A dark-brown juice obtained from a tree abundant in Japan and cultivated largely north of Tokyo. It is thinned with camphor or oil of turpentine or other suitable solvents. The best quality is termed Ki-urushi. Inferior grades are Moku-yshi and Seshine-urushi. Colored lacquers are made from Ki-urushi by warming and mixing in appropriate coloring matters.
Railroad shipping regulations: None.*

Lactanin (Bismuth dilactotannate).
Color and properties: Yellow powder; tasteless; odorless.
Insoluble in water.
Uses: Medicine (tubercular and other chronic diarrheas of young children, unofficial).
Railroad shipping regulations: None.*

Lactase. An enzyme which is capable of changing lactose (q.v.) into dextroglucose and dextrogalactose.

Lactic Acid (Alpha-hydroxypropionic acid; Ethylidenelactic acid)
$CH_3CHOHCOOH$.
Color and properties: Yellow or colorless, thick liquid.
Constants: Sp.gr. 1.2485.
Soluble in water, alcohol and ether.
Derivation: By fermenting starch, corn, potatoes, milk, grape sugar solutions, etc., the best-known process being that called the "Avery" process, and neutralizing the acid as soon as formed, with calcium carbonate. The solution of calcium lactate is concentrated and decomposed with sulfuric acid.
Impurities: Mineral acid.
Grades: Technical 22 to 44%; C.P.; U.S.P.
Containers: Technical: 22%, 450 lb. barrels; 44%, 500 lb. barrels. U.S.P.: 1, 5 lb. bottles; 1, 5 gal. demijohns; 100-120 lb. carboys. C. P.: 1, 5 lb. bottles.
Uses: Leather industry; textile industry; medicine (antiseptic); manufacture of lactates; organic synthesis; brewing; distilled liquors; analytical reagent (especially in yeast manufacture); manufacture of cheese, fruitades, sauerkraut, pickles, etc.; essences, extracts, syrups; baking; solvent for cellulose formate.
Railroad shipping regulations: None.*

Lactin. Lactose (q.v.).

Lactoglucose. See Galactose.

Lactone of Cantharidic Acid. See Cantharidin.

Lactophenine (Lactylphenetidine)
$OC_2H_5C_6H_4NHCOCH(OH)CH_3$.
Color and properties: White, crystalline powder.
Constants: M.p. 118°C.
Soluble in water; slightly soluble in alcohol.
Derivation: By the action of lactic acid on phenetidine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Lactose (Milk sugar; Lactin; Saccharum lactis)
$C_{12}H_{22}O_{11}.H_2O$.
Color and properties: White, hard, crystalline mass or white powder; sweet taste.
Constants: Sp.gr. 1.525; m.p.: Decomposes at 203.5°C.
Soluble in water; insoluble in alcohol and ether.
Derivation: From whey; by concentration and crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. tins.
Uses: Pharmacy; infant foods; bacteriology; baking and confectionery; oleomargarine and butter manufacture.
Railroad shipping regulations: None.*

Lactucarium (Lettuce). Dried juice of the biennial plant Lactucarium, cultivated in Scotland, Germany, Austria and France. Partly soluble in alcohol, ether. Used in medicine (unofficial) to allay cough and quiet nervous irritation.

Lactucin. A bitter principle obtained from Lactucarium, used in medicine (unofficial) with doubtful value.

Lactylphenetidine. See Lactophenine.

Ladanum Oil.
Color and properties: A golden-yellow, essential oil; fine, ambergris odor. A crystalline body separates on standing.
Constants: Sp.gr. 1.011.
Soluble in alcohol, ether and chloroform.
Derivation: By distillation of the gum resin of Cistus creticus.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Perfumes.
Railroad shipping regulations: None.*

Lady's Slipper. See Cypripedium.

Lafou's Reagent. An alkaloidal reagent consisting of a sulfuric acid solution of ammonium selenite

Lake Colors. Dyes used for the making of colo lakes (q.v.).

Lake George Diamonds. See Rock crystal.

Lamb Mint. See Peppermint.

Lamellae. Minute gelatin disks containing traces of alkaloids, designed to be inserted under the eyelid to produce desired effects.

Lamp Black. See under Blacks.

Lamp Oils. See Illuminating oils.

Lana Batu. See Citronella oil.

Lanain. See Lanum.

Lanalin. See Lanum.

Land Plaster. Gypsum (q.v.). or calcined gypsum, finely ground and used as a fertilizer.

Lanesin. See Lanum.

Lanichol. See Lanum.

Laniol. See Lanum.

Lanthana. See Lanthanum oxide.

Lanthanite, Artificial. See Lanthanum carbonate.

Lanthanum La.
One of the rare earth metals (q.v.).
Color and properties: White, malleable, ductil metal; oxidizes rapidly in air.
Constants: Sp.gr. 6.154; m.p. 810°C.
Soluble in acids.
Derivation: By electrolysis of lanthanum chloride.
Grades: Technical
Containers: Boxes.
Uses: Lanthanum salts.
Railroad shipping regulations: None.*

Lanthanum Carbonate (Artificial lanthanite)
$La_2(CO_3)_3.3H_2O$.
Color and properties: White, crystalline powder
Soluble in acids; insoluble in water.
Derivation: By adding sodium carbonate to solution of lanthanum nitrate.
Grades: Technical.
Containers: Boxes.
Uses: Incandescent gas mantles.
Railroad shipping regulations: None.*

Lanthanum Oxide (Lanthana; Lanthanum trioxi Lanthanum sesquioxide) La_2O_3.
Color and properties: White, amorphous powde
Soluble in acids; insoluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By extraction from monazite sand.
Grades: Technical.
Containers: Boxes.
Uses: Instead of lime in calcium lights; incandescent gas mantles.
Railroad shipping regulations: None.*

Lanthanum Sesquioxide. See Lanthanum oxide.

Lanthanum Trioxide. See Lanthanum oxide.

Lanum (Lanolin; Lanalin; Lanain; Lanesin; Laniol; Lanichol; Adeps lanae; Agnin; Agnolin).
Purified wool fat classified either as anhydrous or hydrous. See Lanum, anhydrous and also Lanum, hydrous.
Containers: Cans; kegs; barrels; drums.
Uses: Ointment base; cosmetics; leather-dressing, finishing and softening agent; rosin soaps; superfatting toilet soaps.
Railroad shipping regulations: None.*

Lanum, Anhydrous (Refined wool fat).
Color and properties: Brownish-yellow, tenacious, unctuous mass free of water and having not more than a slight odor.
Constants: M.p. 38° to 42°C.
Soluble in ether, chloroform, hot alcohol; sparingly in cold alcohol; insoluble in water; miscible with about twice its weight of water.
Derivation: A fat obtained from the wool of sheep.
Grades: Technical; U.S.P.
Railroad shipping regulations: None.*

Lanum, Hydrous (Hydrous wool fat).
Color and properties: Yellowish-white, or nearly white, ointment-like mass, incorporated with not less than 25% and not more than 30% of water. Slight odor.
Soluble in ether, chloroform; insoluble in water.
Derivation: A fat obtained from the wool of sheep.
Grades: Technical; U.S.P.
Railroad shipping regulations: None.*

Lapis Calaminaris. See Calamine.

Lapis Lazuli.
A complex mixture of minerals containing calcite, pyroxene, amphibole, mica, scapolite, feldspar, iron pyrites and members of the sodalite group of minerals (sodalite, haüynite, noselite, lazurite), the latter predominating. Color, deep blue, sometimes purplish, often dotted with small pyrite crystals. There is also a yellowish-blue variety dotted with white or gray specks. This comes from Chile. Lazurite is the name of the predominant blue constituent and its formula is given as: $Na_4(NaS_3Al)Al_2(SiO_4)_3$.
Constants: Sp.gr. 2.38 to 2.42; hardness 5.5.
Occurrence: Afghanistan, Chile, Siberia, Italy, Persia.
Uses: Vases; ornamental furniture; mosaics. Was formerly powdered and used as a source of the pigment ultramarine, but its use for this purpose has been superseded by the artificial product.

Lappa (Clotbur; Bardana; Burdock)
Dried root of Arctium lappa and some other species of Arctium.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (diuretic and diaphoretic alterative).
Railroad shipping regulations: None.*

Larch Extract.
Derivation: By leaching the bark of the Pinus larix.
Grades: Larch extract, 25% tannin. Larch crystals, 50% tannin.
Containers: Extract: Wooden barrels. Crystals: Bags.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Lard (Adeps).
Purified internal fat of the hog.
Color and properties: Soft, white unctuous mass, faint odor, bland taste.
Soluble in ether, chloroform, benzine, carbon bisulfide.
Constants: M.p. 36° to 42°C.
Chief constituents: Stearin, palmitin, olein.
Uses: Cooking; pharmacy (ointments, cerates); perfumery (pomades).

Lard, Benzoinated.
Lard containing benzoin, with which it has been heated at a temperature not exceeding 60°C. The benzoin retards rancidity and imparts a pleasant odor to the lard. In hot climates a portion of the lard may be replaced by an equal weight of white wax.
Grades: U.S.P.
Uses: Medicine.
Railroad shipping regulations: None.*

Lard Oil.
Color and properties: Colorless or yellowish oil, with peculiar odor and bland taste.
Chief constituents: Olein, with a small percentage of the glycerides of solid fatty acids.
Constants: Sp.gr. 0.915; saponification value 195 to 196; iodine value 56 to 74.
Soluble in benzene, ether, chloroform and carbon bisulfide; slightly soluble in alcohol.
Derivation: By cold pressing lard.
Impurities: Cotton seed; petroleum oils.
Grades: Prime winter edible; Prime winter inedible; off prime; Extra No. 1; No. 1; No. 2.
Containers: Wooden barrels.
Uses: Lubricant; illuminant; metal cutting compounds; oiling wool; soap manufacture.
Railroad shipping regulations: None.*

Large Fennel. See Fennel.

Largin (Silver protalbin).
Color and properties: Whitish powder, being a compound of silver and protalbin. Contains 11.1% silver.
Soluble in water, glycerol, blood serum, peptone solution.
Containers: Brown bottles.
Uses: Medicine (antiseptic, bactericide, used in gonorrhea, conjunctivitis, catarrhal corneal ulcers, etc.).
Railroad shipping regulations: None.*

Larix Cedrus. See Cedrus.

Larkspur. See Delphinium.

Latex.
The designation "latex" applies to all milky saps occurring in nature, irrespective of their chemical composition. The fact that most of these vegetable excretions contain rubber or hydrocarbons of very similar characteristics has led more and more to the custom of designating all such milky vegetable saps as "latex".

According to Hauser ("Latex", New York, Chemical Catalog Co., Inc., 1930), "the different latices vary in color from milk-white to light gray, yellow or faint pink and in consistency from that of skimmed milk to thick cream. The microscope, even at low magnification, shows that they are not homogeneous true solutions, but dispersions. More careful observation shows that the individual particles of the latex are in constant Brownian movement, that the particle size of the different latices is not the same, that even in the same field of observation particles of different sizes are present, all characteristics of poly-disperse systems. The size and form vary from particles just visible in the ultramicroscope to those having a diameter of 15 to 20 microns and from spherical to rod shaped. The latices are, therefore, partially in colloidal dispersion and partially coarsely dispersed. The disperse phase consists almost entirely of the rubber, gutta-percha or balata hydrocarbon, and such other substances as are present are partly in colloidal dispersion and partly in true solution. Among the latter are, for instance, proteins, sugars, resins, mineral salts, tannins, alkaloids, enzymes and ferments. If the complicated chemical composition, the difficulty of carrying out systematic researches at the place where the rubber is produced, and the fact that the latex of one and the same tree can be changed by uncontrollable factors very decidedly within a few hours are considered, it is easy to understand that, in spite of numerous researches on the latices, our knowledge of them is even today rather meager. It is only in the last two or three years that an attempt has been made to study the chemistry of this peculiar colloid, which is so important commercially, in the condition in which it is first obtained. A dependable chemical analysis of the latices can be made only with the help of the methods of colloid chemistry, in the light of our present general knowledge of that subject. The older purely chemical methods are inadequate and for the most part bring about fundamental changes in the colloidal condition of the material.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

"The increase in importance of Hevea latex with the development of the rubber industry has resulted in the study of the chemistry of its latex almost exclusively, so that our knowledge of the chemical composition of other less important latices is very slight. This is all the more unfortunate because a fundamental knowledge of the chemical and physical composition of the different latices is of the greatest importance for the separation of the rubber and its further treatment and application."

Hevea latex, by far the most important source of rubber, is a milky liquid which may be, according to season, white, gray, yellow or faint pink. This is the color of the fresh latex; the preserved latex may have a different color due to impurities which have their origin either in the materials used for containers or the chemicals used for preservation. A typical chemical analysis of Hevea latex follows: 50 to 55% water, 38 to 40% rubber hydrocarbon, 3% proteins, 3 to 4.5% resins, 0.5 to 1.0% mineral matter.

Uses: Rubber industry (spraying and preparation of rubber mixings by spray methods, impregnation of fabrics and cords, manufacture of spread and dipped goods, manufacture of hose and inner tubes, metal coating by electrical precipitation); manufacture of vessels of hard rubber, door mats, etc., asbestos packing; binder in paper making; production of dulling effect in photographic papers; sticking plaster; paints and lacquers; sponges; manufacture of air-tight containers.
Railroad shipping regulations: None.*

Laudanine $C_{20}H_{25}NO_4$.
Color and properties: Small prisms; poisonous!
Constants: M.p. 166°C.
Soluble in benzene and chloroform; slightly soluble in alcohol and ether.
Derivation: By extraction from opium.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Laudanosine $C_{21}H_{27}NO_4$.
Color and properties: White needles; poisonous!
Constants: M.p. 89°C.
Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: From opium.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Laudanum (Tincture of opium).
Color and properties: Brown liquid; poisonous!
Soluble in alcohol and ether.
Derivation: Granulated opium dissolved in dilute alcohol and purified.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine (pain reliever, sleep powder).
Railroad shipping regulations: None.*

Laughing Gas. See Nitrous oxide.

Laundry Blue. Materials used to color linens with a blue tint in order to hide the yellow color produced by the alkali in the washing process.
Usually a synthetic dye. Soluble Prussian blue is also used for this purpose.
Railroad shipping regulations: None.*
See Iron blues.

Laurel. See Laurus.

Laurel Camphor. See Camphor.

Laurel-berry Oil.
Color and properties: A more viscous oil with a less delicate odor than laurel-leaf oil. It consists of a mixture of a fatty oil and a volatile oil (about 2.5%).
Constants: Sp.gr. 0.915 to 0.935 at 15°C.; optical rotation −14° 10′.
Solubility in alcohol: Insoluble in 80% alcohol; soluble in ½ vol. or more of 90% alcohol.
Derivation: By expression from the berries of the laurel tree.
Uses: In medicine as Oleum lauri expressum.
Railroad shipping regulations: None.*

Laurel-leaf Oil.
Color and properties: Essential oil; light yellow color; odor resembles cajuput oil at first, later sweetish.
Chief known constituents: Cineole, linalool, geraniol, pinene, eugenol, methyl eugenol.
French and German oils:
Constants: Sp.gr. 0.915 to 0.932 at 15°C.; optical rotation −15° to −18°; refractive index 1.467 to 1.477; acid value to 3.0; ester value 28 to 50, after acetylation 58.3 to 77.7.
Solubility in alcohol: In 1 to 3 vols. of 80% alcohol; (some) in 3 to 10 vols. of 70% alcohol (more especially French oils).
Mediterranean oils:
Constants: Sp.gr. 0.916 to 0.944 at 15°C.; optical rotation −4° 40′ to −21° 40′; refractive index 1.465 to 1.474; acid value up to 2.2; ester value 21 to 49, after acetylation 36.2 to 96.
Solubility in alcohol: In 1 to 2 vols. of 80% alcohol; in 2 to 7 vols. of 70% alcohol (average 2 to 3 or 3 to 7 vols.).
Derivation: By distillation of the leaves of Laurus nobilis.
Uses: Medicine.
Railroad shipping regulations: None.*

Laurel Oil, Volatile (Sweet bay oil).
Color and properties: A bright yellow liquid; aromatic odor.
Chief known constituents: Cineole; pinene.
Constants: Sp.gr. 0.924.
Soluble in alchol, ether, chloroform and benzene.
Derivation: Distilled from the leaves or berries of Laurus nobilis.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; tins; iron drums.
Uses: Medicine.
Railroad shipping regulations: None.*

Laurene. See Pinene.

Laurent's Acid. See 1-Naphthylamine-5-sulfonic acid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Laurent's Alpha Acid. See 1-Nitronaphthalene-5-sulfonic acid.

Laurex. A trade name for the zinc salt of lauric acid. It is a light gray soft granular powder with a zinc content about 17% and sp.gr. about 1.10. It is used in rubber compounding to stabilize the curing quality of the rubber.

Laurocerasi Folia (Cherry laurel leaves; English laurel; Cherry bay).

Fresh leaves of Prunus laurocerasus.

Habitat: Southeastern Europe, southwestern Asia.

Uses: Flavoring agent similar to bitter almond, especially in the form of the water.

Laurus (Sweet bay; Bay; Noble laurel; Laurel; Bayberry).

Derivation: Leaves and fruit of Laurus nobilis.

Habitat: Mediterranean region; cultivated in Mexico.

Grades: Technical.

Containers: Bags.

Uses: Medicine; source of expressed bay oil.

Railroad shipping regulations: None.*

Lava. A rock ejected from volcanoes. Lavas are composed mainly of silicates but with a wide range in composition, the silica content ranging from 40 to 80%, the balance generally consisting of oxides of aluminum, iron, calcium, magnesium, potassium and sodium, together with some water.

Lavandin Oil.

Volatile oil of camphoraceous odor.

Derivation: Distillation of flowers of Lavandula latifolia fragrans. It is a cross of lavender and spike, native to the Alps.

Used in perfumery.

Railroad shipping regulations: None.*

"Lavasul." Pure Texas sulfur and carbon scientifically combined according to a patented formula and process. It is said to be non-absorptive and very much stronger structurally than straight sulfur. Its coefficient of expansion is about one-half that of straight sulfur.

Constants: M.p. about 235°F., but should be heated to 250° to 265°F. for best results in pouring.

Corrosion resistance: Thoroughly acid resistant and is recommended for use in connection with all acids and some alkalis, the only exceptions being strong sulfuric and very strong nitric acids. These have a very mild effect upon Lavasul which discolors the acid. This product may be used wherever straight sulfur will withstand the chemical action.

Sizes: 12 lb. blocks.

Containers: Burlap bags.

Uses: Cushioning between sections of segmental grinding wheels and pulp stones; repairing cracked chemical ware; cementing joints of sewer pipes and chemical drains; casting experimental chemical ware and ornamental pieces; chemical-resistant floors; casting slabs for chemical tanks or tower construction.

Lavender (Garden lavender; True lavender).

Color and properties: Grayish-lavender particles.

Chief constituent: Lavender-flower oil.

Derivation: The dried blossoms of Lavandula vera (officinalis).

Habitat: Mediterranean region.

Grades: Technical.

Containers: Boxes; bales.

Uses: Medicine; insectifuge; perfumery; source of lavender oil.

Railroad shipping regulations: None.*

Lavender-flower Oil.

Color and properties: Essential oil; colorless, yellowish, or greenish-yellow; characteristic lavender odor; strongly aromatic, slightly bitter taste.

Chief known constituents: Linalool, linalyl acetate, geraniol, cumarin, furfurol, borneol.

Constants:

French: Sp.gr. 0.882 to 0.896 (15°C.); optical rotation —3° to —9°; refractive index 1.460 to 1.464; linalyl acetate content 30 to 40% (steam distilled above 50%); soluble in 2 to 3 vols. and more of 70% alcohol, steam-distilled oils sometimes in 10 vols. of 70% alcohol.

Franco-Italian Alps: Sp.gr. 0.878 to 0.882 (15°C.); optical rotation —8° to —9°; linalyl acetate content 20 to 30%; soluble in 10 to 12 vols. of 60% alcohol.

Italian Alps: Sp.gr. 0.8826 to 0.8870 (15°C.); optical rotation —6° to —9° 30′; linalyl acetate content 20.3 to 29.6%; soluble in 6 to 8 vols. of 60% alcohol, in 2 to 4 vols. of 65% alcohol and in 1.7 to 2.4 vols. of 70% alcohol.

Lavandin: Sp.gr. 0.8911 to 0.9027 (15°C.); optical rotation —0° 43′ to —1° 35′; linalyl acetate content 6.23 to 18%; soluble in 2 vols. and more of 70% alcohol and in 3 vols. of 65% alcohol.

English: Sp.gr. 0.881 to 0.904 (15°C.); optical rotation —1° to —10°; refractive index 1.465 to 1.470; linalyl acetate content 5 to 10%; soluble in 2 to 3 vols. of 70% alcohol.

Spanish: Sp.gr. 0.900 to 0.914 (15°C.); optical rotation levogyrate to —5°, occasionally dextrogyrate to +4°; linalyl acetate content 1.8 to 7.7%; soluble in 1.5 to 2 vols. and more of 70% alcohol.

Derivation: Distilled from the fresh flowers of several species of the genus Lavandula.

Adulteration: Turpentine oil, cedar-wood oil, lavender-spike oil, terpinyl acetate, geranyl acetate, ethyl esters of the following acids, citric, oxalic, succinic, tartaric.

Containers: 1, 5, 10 lb. bottles; 25-28 lb. tins.

Uses: Perfumery.

Railroad shipping regulations: None.*

Lavender Oil, Terpeneless.

Concentration: About 1.75 to 2 times that of the ordinary lavender oil.

Constants: Sp.gr. 0.893 to 0.898; optical rotation, about —5°.

Solubility in alcohol: 15 parts per 100 parts of 60% alcohol; 55 parts per 100 parts of 70% alcohol.

Railroad shipping regulations: None.*

Lavender-spike Oil (Spike oil).

Color and properties: Yellow essential oil; camphor-like odor suggestive of both lavender and rosemary.

Chief known constituents: Camphor, borneol, camphene, cineole, linalool, geraniol.

Constants:

French: Sp.gr. 0.905 to 0.9176 (15°C.); optical rotation usually dextrogyrate to +6° 44′; occasionally levogyrate to —2°; refractive index 1.464 to 1.468; acid value to 2; ester value 3 to 21 (usually below 10), after acetylation 102 to 112; soluble in 5 to 20 vols. of 60% alcohol, in 3 to 5 vols. of 65% alcohol, in 1.7 to 3 vols. of 70% alcohol.

Spanish: Sp.gr. 0.904 to 0.922 (15°C.); optical rotation —4° 30′ to +15° 47′ (rarely above +8°); refractive index 1.46506 to 1.46535; acid value to 1.8; ester value 4.6 to 26.5, after acetylation 84 to 112; soluble in 1.5 to 2.5 vols. of 70% alcohol.

Dalmatian: Sp.gr. 0.9022 to 0.9033 (15°C.); optical rotation —0° 10′ to —0° 53′; acid value 0.9; ester value 5.6; soluble in 4 to 5 vols. 60% alcohol and in 2 to 3 vols. of 70% alcohol.

Derivation: By distillation of the flowering herb, Lavandula spica, D.C.

Adulteration: Turpentine oil, rosemary oil, Spanish oil of sage.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: 1, 5, 10 lb. bottles; 25 to 28 lb. tins; 55, 110 gal. drums.
Uses: Veterinary medicine; liniments.
Railroad shipping regulations: None.*

Lawsonia Alba. See Henna.

Laxan. See Phenolphthalein.

Laxol. See Phenolphthalein.

Layor Carang. See Agar-agar.

Lazurite. See Lapis lazuli.

Lead (Plumbum) Pb. A heavy malleable, ductile, gray, soft metal of low tensile strength, rarely found native. See also Altaite, Anglesite, Brongniardite, Cerussite, Crocoite, Dufrenoysite, Galena, Jamesonite, Leadhillite, Linarite, Massicot, Mietite, Minium, Plumbojarosite, Pyromorphite.
Constants: Sp.gr. 11.34; m.p. 327°C.; b.p. 1,525°C.
Soluble in dilute nitric acid; insoluble in water.
Derivation: By roasting and reduction principally from the ore, galena.
Method of purification: Desilverizing, oxidation and electrolytic refining.
Impurities: Silver, bismuth and copper.
Types of lead: Chemical; soft (or common); hard; corroding.
Chemical lead. A trade term used to describe the undesilverized lead produced from the southeastern Missouri ores. According to the American Society for Testing Materials, Standard Specifications 1927, it contains from 0.04 to 0.08% copper, 0.005 to 0.015% silver, and less than 0.005% bismuth.
Soft lead. Lead of over 99½% purity.
The American Society for Testing Materials, Standard Specifications 1927 call for lead conforming to the following composition:

	Desilverized **Lead**	† Soft Missouri **Lead**
	Per Cent	
Silver	not over 0.002	not over 0.002
Copper	not over 0.0025	not over 0.04
Arsenic, antimony and tin together	not over 0.015	not over 0.015
Bismuth	not over 0.25	not over 0.005
Iron	not over 0.002	not over 0.005
Zinc	not over 0.002	not over 0.002
Lead (by difference)	not over 99.7265	not over 99.931

† Trade term used to cover soft undesilverized lead.

Hard lead. Lead (originating as a by-product in lead refining) hardened or strengthened by the antimony it contains (up to 16%).
Corroding lead. A lead refined until it is sufficiently pure for the manufacture of white lead by the corroding process. The American Society for Testing Materials, Standard Specifications 1927, call for a lead containing not over 0.0015% silver, 0.0015% copper, 0.0025% copper and silver together, 0.0015% arsenic, 0.0095% antimony and tin together, 0.0015% zinc, 0.002% iron, 0.05% bismuth, and 99.933% lead by difference.
Forms available: Ingots, sheet, pipe, shot, buckles or straps, grids, coils of pipe, tanks, valves, rod, wire, bars, cams, drums, traps, bends and lined or coated equipment.
Uses: Hard lead sheet is used in large quantities for roofing purposes, and both hard and soft lead are used for gutters and drain pipes as well as in the chemical industries. In the manufacture, use and handling of sulfuric acid the use of lead for constructional purposes and equipment is practically indispensable. Lead also has a very widespread application in other chemical industries, as, for instance, phosphoric acid manufacture, sulfonation and chlorination processes, oil-refining, gas production, explosives industries and hydrofluoric acid handling, for lining tanks of various electroplating solutions and electrolytic refining of copper, zinc and cadmium. Some of the types of chemical equipment made from lead include pipes, flanges, valves, stirrers, agitators, tanks, coils, kettles, stills, pumps, evaporators, drying pans and drums. Lead sheet is made by rolling and pipe by extrusion. Sometimes the equipment is made from cast metal, and lead-lined or lead-covered equipment is also used, e.g., pipe, tubes, fittings, valves, coils, drums, autoclaves, tank connections, etc. Corroding lead is used for manufacturing white lead and some lead salts or compounds, however litharge (lead oxide) is more often used in the latter case.
Lead by itself or alloyed is an important metal for the following uses: Babbitt metal (bearing metal), type metal, storage battery grid metal, cable coverings, ammunition, solder, caulking, castings, foil, plumbing, weights, ornamental purposes and lead matrices.
See also Lead lining; lead coating; lead burning; lead, antimonial; lead, blue; lead, chocolate; lead dust; lead, electrolytic; lead shot metal.

Lead Acetate (Sugar of lead)
$Pb(C_2H_3O_2)_2.3H_2O$.
Color and properties: White crystals (commercial grades are frequently brown or gray lumps); poisonous!
Constants: Sp.gr. 2.50; m.p.: Loses $3H_2O$ at 75°C.; b.p. 280°C.
Soluble in water; slightly soluble in alcohol.
Derivation: By the action of acetic acid on litharge or thin lead plates.
Method of purification: Crystallization.
Impurities: Lead carbonate.
Grades: Brown, broken; white, broken; granular; white crystals; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100, 250 lb. kegs; 500, 600-800 lb. barrels.
Uses: Medicine (astringent); lead salts; textiles with alum, as a mordant in dyeing and printing cottons; weighting silk; indigo resist; waterproofing; manufacturing varnishes; lead driers; manufacture of chrome pigments; ingredient of hair dyes; analytical reagent.
Railroad shipping regulations: None.*

Lead Acetate, Monobasic (Lead subacetate)
$Pb_2O(CH_3COO)_2$.
Color and properties: White powder; poisonous!
Soluble in water, alcohol and acids.
Derivation: By the interaction of lead oxide and acetic acid.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Tins; glass bottles.
Uses: Lead salts; analytical chemistry; medicine.
Railroad shipping regulations: None.*

Lead Acetate, Tribasic $Pb(C_2H_3O_2)_2.2PbO.H_2O$.
Color and properties: Lustrous, white, microscopic needles; poisonous!
Soluble in water and alcohol.
Derivation: By the action of acetic acid on lead oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Weighting silk; textile printing.
Railroad shipping regulations: None.*

Lead Antimonate (Naples yellow; Antimony yellow)
$Pb_3(SbO_4)_2$.
Color and properties: Orange-yellow powder; very poisonous!
Insoluble in water.
Derivation: By the interaction of solutions of lead nitrate and potassium antimonate, concentration and crystallization.
Method of purification: Recrystallization.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Wooden kegs.
Uses: Paint pigment; staining glass, crockery and porcelain.
Railroad shipping regulations: None.*

Lead, Antimonial. A large number of lead-antimony alloys are available containing varying amounts of antimony. Commercially the term antimonial lead is usually applied to those alloys containing from 15 to 20% antimony.

Lead Arsenate $Pb_3(AsO_4)_2$.
Color and properties: White crystals; very poisonous!
Constants: Sp.gr. 6.42.
Soluble in nitric acid.
Derivation: By the action of a soluble lead salt on a solution of sodium arsenate, concentration and crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Powder: 24 and 48 lb. cases of ½, 1, 3 lb. sacks; 100 lb. barrels; paste: 50 lb. cases of 1 and 5 lb. tins; 12½, 25, 50, 100 lb. kegs; 300, 600 lb. barrels; C.P.: 1 lb. bottles.
Uses: Insecticide.
Railroad shipping regulations: Class B poison.

Lead Beta-naphthalenesulfonate. See Lead naphthalenesulfonate, beta-.

Lead, Black. See Graphite.

Lead, Blue. A term applied to galena to distinguish it from white lead ore. It is also applied to the blue lead sulfide produced in the sublimation of galena.

Lead Borate $Pb(BO_2)_2.H_2O$.
Color and properties: White powder; poisonous!
Constants: Sp.gr. 5.598.
Soluble in dilute nitric acid; insoluble in water.
Derivation: By the interaction of solutions of lead hydroxide and boric acid, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Varnish and paint drier; waterproofed paints; lead glass; galvanoplastic work.
Railroad shipping regulations: None.*

Lead Burning. Pieces of lead sheet and pipe are joined together by the use of solder or autogenous welding, otherwise known as lead burning. Lead is a comparatively fusible metal and lead burning is accomplished as follows:

The parts to be joined are scraped clean and placed near together. Then a clean bar of the same metal is applied with an oxy-gas or oxy-hydrogen flame so that the three parts melt together locally. This is a simple process (yet it requires skill) and is sometimes used for lead roofing though principally used in making chemical equipment.

Lead Carbolate. See Lead phenate.

Lead Carbonate $PbCO_3$.
Color and properties: White, powdery crystals; poisonous!
Constants: Sp.gr. 6.43.
Soluble in acids; insoluble in water and alcohol.
Derivation: By adding a solution of sodium bicarbonate to a solution of lead nitrate. Occurs in nature as cerussite.
Impurities: Basic lead carbonate.
Grades: Technical.
Containers: Wooden barrels.
Uses: Paint pigment.
Railroad shipping regulations: None.*

Lead Carbonate, Basic (Lead subcarbonate; White lead; Ceruse; Lead flake) $2PbCO_3.Pb(OH)_2$.
Color and properties: White, amorphous powder; poisonous!
Constants: M.p.: Decomposes.
Soluble in acids; insoluble in water.
Derivation: (a) Dutch process. By the corrosion of lead buckles in pots by means of acetic acid and carbon dioxide generated by the fermentation of waste tan-bark. (b) Carter process. By treating very finely divided lead in revolving wooden cylinders with vinegar (dilute acetic acid) and carbon dioxide.
Grades: Dry; ground in oil; C.P.; N.F.
Containers: 1, 5 lb. bottles; 12½, 25, 50, 100 lb. kegs; 500-600 lb. barrels.
Uses: Paint pigment; putty; ceramic glazes.
Railroad shipping regulations: None.*

Lead Chloride $PbCl_2$.
Color and properties: White crystals; poisonous!
Constants: Sp.gr. 5.88; m.p. 498°C.; b.p. 861° to 954°C.
Slightly soluble in hot water and dilute hydrochloric acid; insoluble in alcohol and cold water.
Derivation: By the addition of hydrochloric acid or sodium chloride to a solution of a lead salt, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden barrels.
Uses: Preparation of lead salts; lead chromate pigments.
Railroad shipping regulations: None.*

Lead, Chocolate. A pigment prepared by first calcining lead oxide with about 30% copper oxide and then reducing the product of this operation to a uniform tint by levigation.

Lead Chromate $PbCrO_4$.
Color and properties: Yellow crystals; poisonous!
Constants: Sp.gr. 6.123; m.p.: Decomposes at 600°C.
Soluble in acids; insoluble in water.
Derivation: By interaction of solutions of sodium chromate and lead nitrate.
Method of purification: Washing.
Grades: Technical; C.P.
Containers: 1 lb. bottles; tin cans; wooden barrels.
Uses: Paint pigment.
Railroad shipping regulations: None.*
See also Chrome yellows.

Lead-coating.

Coatings of lead or lead-rich alloys are deposited by the hot-dipping process, by electroplating and by the metal-spray process (see metal spraying).

Hot-dipping process:

According to Rawdon ("Protective Metallic Coatings," New York, The Chemical Catalog Company, Inc., 1928) "when an iron or steel article is immersed in a bath of molten lead, no alloying occurs between the two metals even though the surface may have been thoroughly cleaned previously to immersion. The molten lead, therefore, does not readily 'wet' the surface as zinc and tin do, and instead of forming a thin surface film over the immersed article, the lead coalesces more or less into drops and rivulets when the article is withdrawn from the lead bath. The same is true for brass and copper articles immersed in molten lead. Although lead coatings can be produced on iron and steel if great care is taken in cleaning the surface before attempting the hot-dipping process, such coated articles are always more or less unsatisfactory on account of the pronounced discontinuities in the coating that exist. The claim has been made that if clean steel is dipped in a fluxing bath consisting of a saturated solution of zinc chloride containing 5 per cent ammonium chloride immediately before immersion in the molten lead (at 340° to 360°C.), a quite uniform coating of lead can be produced. Usually it is necessary to give the article two dips both in the flux and the lead bath.

"In order to form a 'bond' for a lead coating, it is necessary to make use of some alloying element common to the two metals, lead and iron. Tin has been used for this purpose for many years as it alloys readily with both metals. Antimony may be used and the use of cadmium and of mercury have also been attempted with some success. Arsenic has also been recommended.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

"The alloying element may either be added in a considerable amount to the lead bath as is the case in the manufacture of terne-plate (q.v.), or a film of the alloying element may be precipitated on the surface of the article which is to be coated, by immersion in a suitable solution prior to passing through the molten metal bath. Electroplating with a suitable bonding metal before dipping so as to form the desired bonding film has also been used to a limited extent.

"Lead coatings show a rather pronounced tendency toward the formation of pinhole perforations as the coating solidifies. In the case of sheets such perforations can be removed by rolling the sheet after it has been coated..

"Baskerville ['Lead-coated iron,' Ind. Eng. Chem., 12:1522 (1920); U. S. Patent 1,378,439 (1921)] has described a process for the production of coatings of relatively pure lead on iron and steel. The material, after pickling, is immersed in a solution of antimony chloride; the film of precipitated antimony serves, by its alloying action after immersion in the bath of molten metal, as a binder for the coating. The molten metal bath used may be either commercially pure lead or an alloy of lead and antimony.

"A somewhat similar process, in which the articles to be coated were passed through a solution of mercuric chloride, has been tried out on a commercial scale. The film of precipitated mercury served as the basis of the alloy-binding layer. On account of the dangers attending the use of the poisonous mercury solution, however, the process did not prove a commercial success.

"Some excellent 'lead-coated' sheets have been made by using galvanized stock as a base upon which the lead coating was formed by immersion in molten lead. Commercial tin plate can be used in the same way as a base for subsequent coating with lead.

"Much secrecy is usually observed with respect to lead-coating processes. The principles involved, however, are those outlined above and the chemical analysis of coatings ordinarily described as 'pure lead' invariably shows the presence of some other metal which was used as the alloying or bonding agent. One such coating described as pure lead had the following composition: lead, 95.8 per cent; tin, 3.8 per cent; and antimony, 0.4 per cent. A coating of approximately this composition might have resulted had the metal been dipped in an antimony solution, as indicated above, prior to immersion in the bath of molten lead, to which an appreciable amount of tin had been added."

Electrolytic process:

The commercial application of lead plating is quite limited. Most of the practical applications of this type of protective coating depend upon the resistance of lead to attack by sulfuric acid. The usefulness of such coatings for protecting steel against an attack of this kind as well as from some of the special chemicals developed for chemical warfare was strongly emphasized by experience during the recent war, although very considerable study of lead plating had been done before that time.

According to Rawdon ("Protective Metallic Coatings," New York, The Chemical Catalog Co., Inc., 1928), "lead can be deposited electrolytically rather easily from a number of solutions but, largely on account of its tendency to form 'trees' when deposited from certain solutions, the baths used commercially are limited to three, which are rather complex in their composition: the fluosilicate, the fluoborate, and the perchlorate solutions of lead. An addition of some substance such as glue is practically always necessary in order to ensure a dense impervious coating. Frölich, Clark and Aborn ["Electrochemical and X-ray Studies of Lead Deposits," Trans. Am. Electrochem. Soc., 49:239 (1926)] place the common lead-plating baths in the following order with respect to their tendency to form 'trees,' the last solution being the best: acetate, nitrate, fluosilicate, fluoborate and perchlorate."

The most important single commercial application of lead plating is for the fittings of storage batteries.

"Lance ['New Leadizing Process for Piping and Steel Plates,' Power, 57:482 (1923)] has described a method for lead-coating steel pipe and sheet which, he states, has been used with success in service where resistance to sulfuric acid was an important feature, such as pipes buried in 'fills' of cinders and ashes and for general usage in railroad shops. The method described consists in plating the pipe or sheet, which must be scrupulously clean (1) by simple immersion in a solution of lead acetate followed (2) by electroplating in a second acetate bath containing some additions. Lead-coated rivets may be used for riveting plates together.

"Lead plating has also been recommended by Blum ['Lead plating from fluoborate solutions,' Trans. Am. Electrochem. Soc., 36:243 (1919)] for lining the copper shells of the ordinary hand fire extinguisher, for lining flues, for conducting the waste gases from gas heaters, as a lining for brine containers and for any chemical equipment in which a sheet-lead lining cannot be attached.

"Since lead coatings are used as a protection against severe chemical corrosion, it is necessary that they be considerably thicker than most other electroplated coatings usually are. Blum and Hogaboom ['Principles of Electroplating and Electroforming,' New York, McGraw-Hill Book Co. (1924)] have recommended a minimum thickness of 0.003 inch (0.075 mm.). If lead coatings show evidence of being slightly porous, they may be improved very materially by slightly working or burnishing the surface."

Lead-coated materials will withstand very severe deformation without any noticeable injury to the coating resulting. Consequently they find considerable application in deep-stamping operations in which the coating aids materially by acting as a lubricant. The paint-holding properties of lead coatings are excellent. Lead is the only common coating metal which is resistant to sulfuric and sulfurous acid fumes.

See also Terne plate, Lead lining, and Lead-burning.

Lead Cyanide $Pb(CN)_2$.

Color and properties: White powder; very poisonous!

Slightly soluble in water.

Derivation: By the interaction of solutions of potassium cyanide and lead acetate.

Grades: Technical.

Containers: Wooden kegs.

Uses: Metallurgy.

Railroad shipping regulations: None.*

Lead Dioxide. See Lead oxide, brown.

Lead Dithiofuroate. See Furac III.

Lead Dust. Lead in very finely powdered form.

Lead, Electrolytic. Pure lead obtained by electrolytic deposition.

Lead Flake. See Lead carbonate, basic.

Lead Glance. Galenite (q.v.).

Lead Hydrate. See Lead hydroxide.

Lead Hydroxide (Lead hydrate; Hydrated lead oxide) $2PbO.H_2O$.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: White, bulky powder; poisonous!
Constants: Sp.gr. 7.592; m.p.: Decomposes at 145°C.
Soluble in alkalis; slightly soluble in water.
Derivation: By the addition of sodium or ammonium hydroxide to a solution of a lead salt with subsequent filtration and drying.
Grades: Technical.
Containers: Cans.
Uses: Lead salts.
Railroad shipping regulations: None.*

Lead Hyposulfite. See Lead thiosulfate.

Lead Iodide PbI_2.
Color and properties: Golden-yellow crystals or powder; poisonous!
Constants: Sp.gr. 6.12; m.p. 358°C.; b.p. 861° to 954°C.
Soluble in potassium iodide and concentrated sodium acetate solutions; insoluble in water and alcohol.
Derivation: By the interaction of lead acetate and potassium iodide.
Method of purification: Crystallization.
Grades: Technical; C.P.; N.F.
Containers: 1 lb. bottles; tin boxes.
Uses: Bronzing; mosaic gold; printing; photography; medicine (externally as ointment).
Railroad shipping regulations: None.*

Lead, Kremnitz (Krems). White lead (q.v.).

Lead Lining. While lead is sometimes used for making tanks without reinforcement by other structural materials, it more often is used as a lining or coating metal. Frequently tanks are made with loose linings of sheet lead surrounded by a wooden, steel or concrete exterior, and very often the sheet lining is strapped or bolted to the reinforcing structure. In special cases, lead is adherently lined or coated upon steel or copper particularly for use in the chemical industries. One method of joining lead to the reinforcing metal is by means of a film of solder while the so-called homogeneous coating or lining consists in having the lead directly united to the reinforcing metal. In preparing such chemical equipment, the lead is fused upon the steel or other base metal with the aid of very careful fluxing. Chemical lead sheet is produced with a reinforcement of hard lead analogous to the reinforcement of glass with wire.

Lead Linoleate (Lead plaster) $Pb(C_{18}H_{31}O_2)_2$.
Color and properties: Yellowish-white paste; poisonous!
Soluble in acids.
Derivation: By heating a solution of lead nitrate with sodium linoleate.
Grades: Technical.
Containers: 125, 400 lb. drums.
Uses: Medicine; varnish.
Railroad shipping regulations: None.*

Lead Marcasite. A native zinc sulfide identical with sphalerite (q.v.). Miners refer to it as blend, mock lead, mock ore.

Lead Molybdate $PbMoO_4$.
Color and properties: Yellow powder; poisonous!
Soluble in acids; insoluble in water and alcohol.
Derivation: By adding a solution of lead nitrate to a solution of ammonium molybdate, concentration and crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Boxes.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*
See also Wulfenite.

Lead Monoxide. See Litharge.

Lead Naphthalenesulfonate, Beta- $Pb(C_{10}H_7SO_3)_2$.
Color and properties: White crystalline powder; poisonous!
Soluble in alcohol; insoluble in water.
Derivation: By the action of lead acetate on beta-naphthalenesulfonic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Kegs.
Uses: Organic preparations.
Railroad shipping regulations: None.*

Lead Nitrate $Pb(NO_3)_2$.
Color and properties: White crystals; promotes combustion in contact with organic matter; poisonous!
Constants: Sp.gr. 4.53; m.p.: Decomposes between 205° and 223°C.
Soluble in water and alcohol.
Derivation: By the action of nitric acid on lead.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 1 lb. cartons; 5, 25, 50 lb. boxes; 500 lb. barrels; 950 lb. casks.
Uses: Lead salts; medicine; mordant in dyeing and printing calico; matches; paint pigment; mordant for staining mother-of-pearl; oxidizer in the dye industry; sensitizer in photography; explosives; tanning; process engraving and lithography.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Lead Ocher. Massicot (q.v.).

Lead Oleate $Pb(C_{18}H_{33}O_2)_2$.
Color and properties: White, ointment-like granules or mass; poisonous!
Soluble in alcohol, ether, turpentine and benzene; insoluble in water.
Derivation: By the interaction of lead acetate and sodium oleate.
Grades: Technical.
Containers: Wooden kegs; 500 lb. drums.
Uses: Varnishes; lacquers; paint drier.
Railroad shipping regulations: None.*

Lead, Orange. See Orange mineral.

Lead Ore, White. See Cerussite.

Lead Oxide, Brown (Lead dioxide; Anhydrous plumbic acid; Lead peroxide; Lead superoxide) PbO_2.
Color and properties: Brown, hexagonal crystals; will cause many materials to take fire if merely mixed with them owing to its strong oxidizing action hence care needed in storing and shipping; poisonous!
Constants: Sp.gr. 8.91; m.p.: Decomposes.
Soluble in glacial acetic acid; insoluble in water and alcohol.
Derivation: By adding bleaching powder to an alkaline solution of lead hydroxide.
Impurities: Lead chloride.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; iron drums.
Uses: Oxidizing agent; medicine; oxidizing agent in dye and intermediate manufacture; electrodes; batteries; rubber substitutes; textiles (mordant, discharge in dyeing with indigo); matches; explosives; analytical reagent.
Railroad shipping regulations: None(?)*

Lead Oxide, Hydrated. See Lead hydroxide.

Lead Oxide, Red (Red lead; Minium; Plumboplumbic oxide) Pb_3O_4.
Color and properties: Bright red powder.
Constants: Sp.gr. reported variously, 8.32 to 9.16; m.p.: Decomposes between 500° and 530°C.
Soluble in acids; insoluble in water.
Derivation: By carefully heating litharge in a furnace in a current of air.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical; U.S.P.; C.P.; N.F.
Containers: 1, 5 lb. bottles; 12½, 25, 50, 100, 150 lb. kegs; 100 lb. bags; 500 lb. barrels.
Uses: Storage batteries; paints; glass; pottery and enameling; varnish; lead peroxide; purification of alcohol; packing pipe joints; rubber pigment; red pencils.
Railroad shipping regulations: None.*

Lead Oxide, Yellow. See Litharge.

Lead Peroxide. See Lead oxide, brown.

Lead Phenate (Lead phenolate; Lead carbolate) $Pb(OH)OC_6H_5$.
Color and properties: Yellowish to grayish-white powder; poisonous!
Soluble in nitric acid; insoluble in water and alcohol.
Derivation: By boiling phenol with litharge.
Grades: Technical.
Containers: Wooden boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Lead Phenolate. See Lead phenate.

Lead Phenolsulfonate (Lead sulfocarbolate) $Pb(C_6H_4OHSO_3)_2.5H_2O$.
Color and properties: White crystals or powder.
Soluble in water and alcohol.
Uses: Medicine (astringent and antiseptic, unofficial).
Railroad shipping regulations: None.*

Lead Plaster. See Lead linoleate.

Lead Protoxide. See Litharge.

Lead, Red. See Lead oxide, red.

Lead Resinate $Pb(C_{20}H_{29}O_2)_2$.
Color and properties: Yellowish-white paste; poisonous!
Insoluble in most solvents.
Derivation: By heating a solution of lead acetate and rosin oil.
Impurities: Lead oxide.
Grades: Technical.
Containers: 50 lb. kegs; 115 lb. barrels.
Uses: Paint and varnish drier; textile waterproofing agent.
Railroad shipping regulations: None.*

Lead Sesquioxide Pb_2O_3.
Color and properties: Reddish-yellow powder.
Constants: M.p. 370°C.
Soluble in alkalis and acids; insoluble in water.
Derivation: By gently heating metallic lead.
Grades: Technical.
Containers: Wooden kegs.
Uses: Medicine; ceramics; ceramic cements; metallurgy; varnishes; paint pigment.
Railroad shipping regulations: None.*

Lead Shot Metal.
An alloy of lead and arsenic. The arsenic content may range from 0.3 to 0.8% and may be added either in the form of white arsenic or arsenical dross. The arsenic performs an important function, imparting a greater fluidity to the metal and increases the tendency of the metal to assume a spherical form in passing through the air when dropped from the top of the lead shot tower. With too little arsenic, the drops are pear-shaped, with too much they become double-convex. The addition of about 0.025% sodium sulfide to the water at the bottom of the tower prevents oxidation of the lead.

Lead Silicate $PbSiO_3$.
Color and properties: White, crystalline powder.
Insoluble in most solvents.
Derivation: By the interaction of lead acetate and sodium silicate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Ceramics; fireproofing fabrics.
Railroad shipping regulations: None.*

Lead-soap Lubricants. Lead salts saponified with fats. These lubricants are hard at low temperatures and viscous at ordinary temperatures, but they become somewhat fluid on heating by friction. Due to their high melting point they are not suitable for high speed work.
Railroad shipping regulations: None.*

Lead Stearate $Pb(C_{18}H_{35}O_2)_2$.
Color and properties: White powder.
Soluble in ether and alcohol.
Derivation: By heating a solution of lead acetate with sodium stearate.
Grades: Technical.
Containers: Tin cans.
Uses: Varnish and lacquer drier.
Railroad shipping regulations: None.*

Lead Subacetate. See Lead acetate, monobasic.

Lead Subcarbonate. See Lead carbonate, basic.

Lead, Sugar of. See Lead acetate.

Lead Sulfate $PbSO_4$.
Color and properties: White, rhombic crystals; poisonous!
Constants: Sp.gr. 6.12 to 6.39.
Slightly soluble in hot water; slowly soluble in nitric acid; insoluble in alcohol.
Derivation: By the interaction of solutions of lead nitrate and sodium sulfate.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 500 lb. barrels.
Uses: Paint pigments.
Railroad shipping regulations: None.*

Lead Sulfide (Plumbus sulfide) PbS.
Color and properties: Silvery, metallic crystals or black powder.
Constants: Sp.gr. 7.13 to 7.7; m.p.: Decomposes.
Soluble in acids; insoluble in water and alkalis.
Derivation: (a) Found in nature as the mineral galenite (q.v.). (b) By passing hydrogen sulfide gas into an acid solution of lead nitrate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Ceramics; metallic lead.
Railroad shipping regulations: None.*

Lead Sulfocarbolate. See Lead phenolsulfonate.

Lead Superoxide. See Lead oxide, brown.

Lead Tetrachloride $PbCl_4$.
Color and properties: Yellow, oily liquid; poisonous!
Constants: Sp.gr. 3.18; m.p. −15°C.
Decomposes in contact with water.
Derivation: By passing chlorine gas into lead chloride dissolved in concentrated hydrochloric acid.
Grades: Technical.
Containers: Iron drums.
Uses: Inorganic synthesis.
Railroad shipping regulations: None.*

Lead Thiosulfate (Lead hyposulfite) PbS_2O_3.
Color and properties: White crystals; poisonous!
Constants: M.p.: Decomposes.
Soluble in acids and sodium thiosulfate solution; insoluble in water.
Derivation: By the interaction of solutions of lead nitrate and sodium thiosulfate, concentration and crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Inorganic synthesis.
Railroad shipping regulations: None.*

Lead Tungstate (Lead wolframate) $PbWO_4$.
Color and properties: Yellowish powder; poisonous!
Constants: Sp.gr. 8.235.
Soluble in acid; insoluble in water.
Derivation: By mixing solutions of lead nitrate

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

and sodium tungstate, concentrating and crystallizing.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Pigment.
Railroad shipping regulations: None.*

Lead Vitriol. Anglesite (q.v.).

Lead Water. A 1% solution of basic lead acetate.

Lead, White. See Lead carbonate, basic.

Lead, White, Sublimed. See White lead, sublimed.

Lead Wolframate. See Lead tungstate.

Lead Yellow. See Chrome yellows.

Leadhillite. Natural sulfato-carbonate of lead, perhaps $4PbO.SO_3.2SO_2.H_2O$. Arizona.

Leaf Green. A very durable pale green pigment obtained by igniting a mixture of chromic oxide and pure aluminum hydrate. A name also applied to chlorophyll (q.v.).

Leather, Artificial. A material usually produced by coating a fabric with a dope consisting of a mixture of pyroxylin, castor or other oil, and pigments in an organic solvent. The solvent evaporates leaving a tough flexible coating. Ornamental effects can be produced by passing the finished leather through calendar rolls or embossing presses.

Leather Scrap. Leather clippings. Contains 7 to 16% ammonia. Made into base goods (q.v.).
Railroad shipping regulations: None.*

Lecithin (Ova-lecithin). The phosphorus-containing constituent of brain substance.
Derivation: Obtained from egg yolk or cereal grains.
Color and properties: Yellowish-white, waxy mass.
Soluble in alcohol, chloroform and ether; insoluble in water.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Lees Black. See under Blacks, Vegetable black.

Le Farge Cement. See under Cements, structural, Grappier cement.

Leiocom. See Dextrin.

Leipzig Yellow. See Chrome yellows.

Lemeet. See Aluminum acetate.

Lemery's White Precipitate. See Mercuric-ammonium chloride.

Lemnian Earth (Lemnos earth).
Color and properties: Yellow, red, or grayish earthy material. A hydrated aluminum silicate.
Derivation: An ocher (q.v.) found at Lemnos.
Uses: Pigment.

Lemnos Earth. See Lemnian earth.

Lemon-balm Oil. See Balm oil.

Lemon Chrome. See Chrome yellows.

Lemon-grass Oil (Verbena oil, East Indian; Graminis citrati oil).
Color and properties: Yellowish or brownish-yellow liquid, fragrant odor.
Chief known constituent: Citral (70 to 85%).
Constants: Sp.gr. 0.895 to 0.905.
Soluble in alcohol, ether, chloroform, acetone and benzene.
Derivation: Distilled in the East Indies from the grass, Andropogon citratus.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Food extracts; perfumery (manufacture of ionone).
Railroad shipping regulations: None.*

Lemon-grass Oil, Tepeneless.
Concentration: About 1.5 times that of the ordinary lemon-grass oil. It consists principally of citral.
Constants: Sp.gr. 0.896 to 0.897; optical rotation −1° to −1° 4′.
Solubility in alcohol: 60 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Lemon Oil (Limonis oil).
Color and properties: Pale yellow, limpid liquid; fragrant lemon-like odor; aromatic, mild, bitterish taste.
Chief known constituents: Citral; limonene; phellandrene; levo- and dextro-pinene; limene (bisabolene); geraniol; linalool; esters; aldehydes (nonylic, octylic and decylic) and citraptene. Citral content: 3.5 to 5%.
Constants: Sp.gr. 0.856 to 0.861 (sometimes 0.854); optical rotation +56° to +67°; refractive index 1.474 to 1.476; evaporation residue 2.1 to 6.6.
Solubility in alcohol: Not perfectly soluble in 6 to 8 vols. of 90% alcohol; soluble in 0.5 to 1 vol. of 95% alcohol.
Derivation: By expression from fresh lemon peel, the rind of the recent fruit of Citrus limonum, Risso.
Containers: Glass bottles; tins; copper flasks.
Uses: Flavoring agent; soft drinks; perfumery; confectionery; polishes.
Railroad shipping regulations: None.*

Lemon Oil, Terpeneless.
Concentration: About 20 times that of the ordinary lemon oil.
Constants: Sp.gr. 0.896 to 0.900; optical rotation 0° to −8°.
Solubility in alcohol: 10 to 20 vols. in 100 vols. of 70% alcohol, and in all proportions of 90% alcohol.
Railroad shipping regulations: None.*

Lemon Peel
Derivation: The outer rind of the ripe fruit, Citrus limonum.
Habitat: Northern India, cultivated in Italy and West Indies, Spain, United States and other semi-tropical countries.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Cooking; confectionery; lemon oil.
Railroad shipping regulations: None.*

Lemon, Salt of, Essential. See Potassium binoxalate.

Lemon Yellow. See Chrome yellows.

Lemonal. See Linalyl acetate.

Leopard's Bane. See Arnica flowers.

Lepidine (Gamma-methylquinoline; Methylquinoline; Cincholepidine).
$C_6H_4C(CH_3)CHCHN$.
Color and properties: An oily liquid; quinoline-like odor; turns red-brown on exposure to light.
Soluble in alcohol, ether and benzene; slightly soluble in water.
Derivation: From cinchonine.
Method of purification: Rectification.
Grades: Technical.
Containers: Amber glass bottles.
Uses: Organic preparations.
Railroad shipping regulations: None.*

Lepidolite. See Mica.

Lepidomelane. See Mica.

Leptandra (Culver's root; Black root).
Derivation: Dried rhizome and roots of Veronica virginica.
Habitat: Eastern United States.
Grades: Technical.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Bags.
Uses: Medicine (cathartic).

Leptandrin. An indefinite mixture made by adding water to a strong alcoholic tincture of leptandra. Used in medicine (unofficial) similar to leptandra.

Leptynol. Colloidal palladious hydroxide suspended in oil, used in medicine in the hypodermic treatment of obesity. Unofficial.
Railroad shipping regulations: None.*

Le Sage Cement. See under Cements, structural.

Lethane 22. Trade name for an insecticidal fumigant of high effectiveness.

Lethane 145. Trade name for a powerful insecticide base which is used as a substitute for pyrethrum.

Lettuce. See Lactucarium.

Leucite $KAl(SiO_3)_2$ or $K_2O.Al_2O_3.4SiO_2$.
A natural potassium-aluminum silicate found in lava. Color, white or gray; white streak; vitreous or greasy luster. Contains 19.5% potash.
Constants: Sp.gr. 2.45 to 2.50; hardness 5.5 to 6.
Occurrence: United States (Wyoming, Montana, Arkansas), Italy (most abundant source), Brazil, Sardinia, Bohemia, Asia Minor, Africa, Australia, Java, Borneo, Siberia.
Uses: Possible future source of potash.

Leuco-Alizarin. See Anthrarobin.

Leucogen. See Sodium bisulfite.

Leucoline. See Quinoline.

Leuconine. See Leukonin.

Leucopyrite. See Löllingite.

Leukol.
A name given by Runge to quinoline (q.v.).

Leukonin (Leuconine). A proprietary name for an antimony compound used as a substitute for tin oxide in enameling. It is said to contain 98% sodium metantimoniate.
Railroad shipping regulations: None.*

Leukopal O. A trade name for a practically neutral, oil-soluble resin, of hardness equal to zanzibar copal. Varnishes made with this resin are neutral to basic pigments and are stated to be very resistant to acids, alkalis, and atmospheric conditions. It is adaptable to the manufacture of all types of interior and exterior varnishes, baking enamels and insulating varnishes. This resin comes in pale, medium, and dark grades.

Leunaphos IG. A proprietary brand of fertilizer prepared from German synthetic ammonia. It is said to consist of a mixture of ammonium sulfate and diammonium phosphate containing 20% nitrogen, all of it in the ammonia form, and 20% available phosphoric acid, mostly (18.5%) water-soluble.
Color: Gray, fine crystalline salt.
Soluble in water.
Containers: Burlap sacks.
Railroad shipping regulations: None.*

Leunasalpeter BASF.
A proprietary brand of nitrogen fertilizer prepared from German synthetic ammonia. It is said to consist of double salts of ammonium sulfate and ammonium nitrate and is said to represent 26% nitrogen, of which about one-fourth is in the form of nitrate nitrogen and three-fourths in the form of ammonia nitrogen.
Color: White to light gray.
Soluble in water.
Derivation: By solution mix of molecular equivalents of ammonium nitrate and ammonium sulfate.
Containers: Single burlap bags.
Railroad shipping regulations: None.*

Levant Soapwort. See Gypsophila.

Levant Wormseed. See Santonica.

Leveling Agents.
Compounds added to the dye bath in conjunction with certain dyes to assist in bringing about the level or even deposition of the latter.

Levisticum. See Lovage.

Levisticum Oil. See Lovage oil.

"Levuline." The proprietary name of a preparation used in the textile industry for finishing.

Levulose. See Fructose.

Levurargyre (Nuclein mercurate; Mercury nucleoprotein).
Color and properties: Grayish-white powder, unaffected in solution by hydrogen sulfide.
Soluble in water.
Uses: Medicine (hypodermic treatment of syphilis, unofficial).
Railroad shipping regulations: None.*

Lewisite. A military poison gas developed by the Chemical Warfare Service of the United States Army during the late war.

Ley. See Sodium hydroxide and Potassium hydroxide.

Leyden Blue. See Cobalt blue.

Liatria (Deer's tongue; Vanilla plant).
Derivation: Leaves of Liatris odoratissima.
Habitat: United States (Virginia to Florida and Louisiana).
Grades: Technical.
Containers: Boxes.
Uses: Medicine; perfumery; flavoring tobacco.
Railroad shipping regulations: None.*

Libethenite.
$Cu_3P_2O_8.Cu(OH)_2$ or $4CuO.P_2O_5.H_2O$.
Dark olive-green mineral with olive-green streak, resinous luster. Practically a replacement of the arsenate in olivenite (q.v.). Contains 29.8% phosphorus pentoxide, 66.4% cupric oxide, balance water.
Soluble in nitric acid.
Constants: Sp.gr. 3.6 to 3.8; hardness 4.
Occurrence; United States (Arizona), Germany, Hungary, Russia, Belgium, England.

Lichen Blue. See Litmus.

Lichenic Acid. See Fumaric acid.

Lichenin $C_6H_{10}O_5$.
Color and properties: Amorphous compound resembling and isomeric with starch.
Soluble in water.
Derivation: From Iceland moss.
Railroad shipping regulations: None.*

Lichens. Low, flowerless, thallophytic plants. They do not form leaves or stems but are found as gray, yellow, brown or black, crust-like patches upon rocks, trees and the like. They are composed of loose cellular tissue, a slender white-celled parasitic ascomycetous or (rarely) basidiomycetous fungus, and a number of globular greenish or bluish algal cells upon which the fungal cells prey. Some of the species are employed in medicine, others as dyes and foods. See Iceland moss, Crottle and also Orchil and Orchin.
Railroad shipping regulations: None.*

Licorice. See Glycyrrhiza.

Lictenberg Alloy. See table under Fusible metals.

Life Root. See Senecio.

Light Oils. Fractional distillates from coal-tar, with boiling points ranging from 110° to 210°C., consisting of a mixture of benzene pyridine, toluene, xylene, phenol and cresols.
Grades: Technical.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Tank cars; iron drums.
Uses: Source of benzene, solvent naphthas, toluene, xylene, phenol and cresols.
Fire hazard; Dangerous.*
Railroad shipping regulations: Red label.

Light Red. A red pigment obtained by calcining yellow ocher. See Ocher.

Lighthouse Lamp Oil. See Burning oils, mineral.

Lignaloe Oil. See Linaloe oil, Mexican.

Lignite (Brown coal). A brownish-black coal in which the alteration of vegetable material has proceeded farther than in peat, but not so far as in sub-bituminous coal. The distinction of lignite from these materials is not sharp, as the transition from one to the other is gradual. In general, lignite is denser, darker in color and contains more carbon than peat.

Composition range:

	Per Cent
Moisture	9.05 to 22.48
Volatile	31.36 to 37.96
Fixed carbon	26.73 to 43.03
Ash	4.79 to 19.43

Railroad shipping regulations: None.*

Lignocellulose. A substance with which the cellulose of young plants becomes incrusted as it grows old and becomes woody fiber. It is not a carbohydrate and little is known of its chemical nature.

Lignolite. See under Cements, constructional, Magnesium oxychloride cement.

Lignum Vitae. See Guaiac wood.

Ligroin, Light. See Petroleum ether.

Ligusticum. See Lovage.

Lilacine. See Terpineol.

Lily-of-the-Valley. See Convallaria.

Lima Oil. Petroleum (q.v.).

Lima Wood (Cesalpina echinata; Fernambuco; Pernambuco).
Derivation: A redwood of commerce obtained from Caesalpinia bijuga.
Habitat: Peru and Central America.
Grades: Technical.
Uses: The extract is used in dyeing textiles red.
Railroad shipping regulations: None.*

Lime. See Calcium oxide.

Lime, Air-slaked. Lime which has absorbed carbon dioxide and moisture from exposure to the atmosphere. It consists of a powder composed of calcium carbonate and calcium hydroxide.
Railroad shipping regulations: None.*

Lime Blue. Mountain blue or Bremen blue (q.v.) mixed with varying quantities of gypsum.

"Lime, Chloride of." See Calcium hypochlorite.

Lime, Chlorinated. See Calcium hypochlorite.

Lime, Compounds of. See corresponding compounds of calcium.

Lime, Fat. A pure lime which combines readily with water to form a fine white powder, free from grit, and which makes a smooth stiff paste with an excess of water.
Railroad shipping regulations: Must not be loaded hot.

Lime Green.
(a) A pigment produced by precipitating copper sulfate solution with calcium hydroxide.
(b) A water-color pigment obtained by heating soda ash, kaolin, silica, sulfur and coal. It is also known as green ultramarine. See Ultramarine, blue.
Railroad shipping regulations: None.*

Lime Hydrate. This term is probably more commonly used as a convenient synonym for the chemical calcium hydroxide (q.v.) than for the commercial product known as hydrated lime (q.v.).

Lime, Hydrated.
A term usually applied to the commercial limes marketed as such after having been slaked with the correct quantity of water to yield a dry, fine powder.
Railroad shipping regulations: None.*

Lime, Hydraulic. A variety of calcined limestone which, when pulverized, absorbs water without swelling or heating and gives a cement that hardens under water. The limestone burned for this purpose usually contains from 10 to 17% silica, alumina and iron and from 40 to 45% lime, with magnesia sometimes replacing lime to a considerable extent. Hydraulic limes slake more slowly than do ordinary limes and range all the way from those with feeble hydraulic properties to limes which harden well under water.
Railroad shipping regulations. Must not be loaded hot.

Lime Hypophosphite. See Calcium hypophosphite.

Lime, Lean. A lime which does not slake freely with water due to the fact that it has been prepared from limestone containing a high percentage of impurities, e.g., silica, iron, alumina, etc.
Railroad shipping regulations: Must not be loaded hot.

Lime, Liver of. See Lime, sulfurated.

Lime-nitrogen. See Calcium cyanamide.

Lime, Slaked. See Lime, hydrated.

Lime, Sulfurated (Calcic liver of sulfur; Liver of lime; Hepar calcis; Calcium sulfide, crude; Calx sulfurata). A mixture of calcium monosulfide and sulfate.
Color and properties: Yellowish-gray or grayish-white powder; odor of hydrogen sulfide.
Soluble in acids; insoluble in water and alcohol.
Derivation: By roasting calcium sulfate with coke.
Grades: Technical.
Containers: Iron drums.
Uses: Medicine (bactericide for treatment of parasitic skin diseases); depilatory; luminous paint.
Railroad shipping regulations: None.*

Lime Oil (Limette oil).
An oil obtained from Citrus medica, L., var. acida, Brandis, which is grown in the West Indies. Two different oils are produced, one by expression and the other by distillation of the peel, also as a by-product in the evaporation of lime juice used for the production of citric acid.

Expressed oil:
Color and properties: A golden-yellow oil hardly distinguishable from a high-grade lemon oil but having a more intense odor.
Chief known constituents: Citral, bisabolene, citroptene. Citral content: 2.2 to 6.6% (Burgess).
Constants: Sp.gr. 0.878 to 0.901 (usually 0.880 to 0.884) at 15°C.; optical rotation +32° to +38°; refractive index 1.482 to 1.486; evaporation residue 10 to 18%; saponification value of the residue 160 to 181.
Solubility in alcohol: In 4 to 10 vols. of 90% alcohol (with turbidity, bluish fluorescence and separation of waxy constituents).

Distilled oil:
Color and properties; Unpleasant turpentine odor.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Chief known constituents: Terpineol, bisabolene. No citral.
Constants: Sp.gr. 0.860 to 0.870 at 15°C.; optical rotation +33° to +47°; refractive index 1.4702 to 1.4707.
Containers: Bottles; cans.
Uses: Extracts; flavoring; perfumery; toilet soaps; cosmetics.
Railroad shipping regulations: None.*

Lime Oil, Terpeneless.
Concentration: About 12 to 16 times that of the ordinary oil.
Constants: Sp.gr., (about) 0.92 to 0.93; optical rotation, (about) −2°.
Railroad shipping regulations: None.*

Lime Nitrate. See Calcium nitrate.

Lime Saltpeter. See Calcium nitrate.

Lime-sulfur Solution. A solution made by boiling together lime (50 lbs.), sulfur (100 lbs.) and water (100 gals.) and diluting to one-tenth strength. Used extensively as a fungicidal spray on fruit trees and as a sheep dip.
Railroad shipping regulations: None.*

Lime-uranite. See Autunite.

Lime Water.
Color and properties: Clear, colorless, odorless, alkaline liquid. Absorbs carbon dioxide from the air.
Constants: Sp.gr. (about) 1.00 (25°C.).
Derivation: An aqueous solution of calcium hydroxide containing not less than 0.14 grams of $Ca(OH)_2$ in each 100 cc. at 25°C. Note: The strength varies with the temperature at which the solution is stored diminishing as the temperature rises.
Uses: Medicine (antacid, dyspepsia, diarrhea, nausea, vomiting, pseudo-membranous croup).
Railroad shipping regulations: None.*

Limene. See Bisabolene.

Limestone $CaCO_3$.
A rock composed mainly of calcium carbonate in the form of the mineral calcite (q.v.). Limestones are sometimes classed according to the impurities contained, e.g.,
Dolomitic limestone: Usually a limestone containing more than 5% magnesium carbonate. See dolomite.
Magnesium limestone: A term used interchangeably with dolomitic limestone.
Argillaceous limestone: A limestone containing clay.
Siliceous limestone: A limestone containing sand or quartz.
Limestones are also named according to the formation in which they occur. See also marble.
Occurrence: Found in all parts of the United States except the District of Columbia and North Dakota, Germany, Austria, England, other countries.
Railroad shipping regulations: None.*

Limestone, Hydraulic. See Lime, hydraulic.

Limette Oil. See Lime oil.

Limonene, Inactive. See Dipentene.

Limonis Oil. See Lemon oil.

Limonite (Brown Hematite; Brown ironstone clay; Brown iron ore) $2Fe_2O_3 . 3H_2O$ or $Fe_2(OH)_6 . Fe_2O_3$.
Frequently impure from sand, clay, manganese, phosphorus, etc. Brown, blackish, or yellow, rusty mineral, yellowish-brown streak. Luster varies from varnish-like through silky to dull. Contains 59.8% iron or 85.5% iron sesquioxide. Water content varies widely. Found in three varieties:
Bog iron. Loose, porous, aggregated ore from marshy ground.
Yellow ocher (Umber). Earthy material, intermixed with clay. See also Umber.
Brown clay (Ironstone). Compact, often nodular masses, with clay.
Constants: Sp.gr. 3.6 to 4; hardness 5 to 5.5.
Occurrence: United States (Alabama, Michigan, Tennessee, and other states), Germany, Luxemberg, Scotland, Sweden.
Uses: Important ore of iron; yellow pigment.

Linaloe Oil (Cayenne linaloe oil; Bois de rose femelle oil; Bois de rose mâle).
Color and properties: Colorless oil, with linalool odor.
Chief known constituents: Linalool; geraniol; terpineol.
Constants: Sp.gr. 0.870 to 0.880 at 15°C.; optical rotation −10° to −19°; index of refraction 1.461 to 1.463; acid value up to 1.3; ester value up to 6.3.
Solubility in alcohol: In 1.5 to 2 vols. or more of 70% alcohol in 4 vols. or more of 60% alcohol.
Soluble in ether, chloroform and benzene.
Derivation: Distilled from a wood of uncertain botanical origin found in French Guiana. It is thought that Ocotea caudata is the source of bois de rose, mâle and Protium altissimum of bois de rose, femelle. There is also a Mexican variety.
Uses: Perfumery.
Railroad shipping regulations: None.*

Linaloe Oil, Mexican (Lignaloe oil).
Color and properties: Water-white or yellowish oil.
Chief known constituents: Linalool; geraniol; terpineol.
Constants: Sp.gr. 0.875 to 0.891 at 15°C.; optical rotation −3° to −14°; refractive index, 1.460 to 1.465; acid value up to 3.0; ester value 1 to 42.
Solubility in alcohol: In 1.5 to 2 vols. of 70% alcohol; in 4 to 5 vols. or more of 60% alcohol.
Derivation: By distilling the wood and fruit of several species of Bursera.
Habitat: Mexico.
Containers: 5 lb. bottles; 25, 40 lb. tins; 80 lb. cases.
Uses: Perfumery.
Railroad shipping regulations: None.*

Linaloe Wood. The strongly fragrant wood of Cayenne and French Guiana which, upon distillation, yields linaloe oil (q.v.). When exported, it is in the form of cord wood from which the bark has not been removed. It is hard and heavy, cleaves easily, and the surface is reddish although yellow when freshly cut.
Railroad shipping regulations: None.*

Linalool $C_{10}H_{17}OH$.
Color and properties: Colorless liquid; odor similar to that of bergamot oil and French lavender.
Constants; Sp.gr. 0.873; b.p. 195° to 199°C.
Soluble in alcohol and ether.
Derivation: From linaloe oil.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; copper flasks.
Uses: Perfumery.
Railroad shipping regulations: None.*

Linalyl Acetate (Bergamiol) $C_{10}H_{17}C_2H_3O_2$.
Color and properties: Clear, colorless, oily liquid; odor of bergamot.
Constants: B.p. 108° to 110°C.
Soluble in alcohol and ether.
Derivation: By the action of acetic acid on linalool in presence of sulfuric acid.
Method of purification: Rectification.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.

Containers: Glass bottles.

Uses: Extracts; perfumery.

Railroad shipping regulations: None.*

Linarite $(Pb,Cu)SO_4 . (Pb,Cu)(OH)_2$.

A natural basic sulfate of lead and copper. Deep blue crystals.

Occurrence: United States (California, Utah, Arizona), Scotland, England, Siberia, Australia, Sardinia, Canada.

Linden (Tilia; Basswood; White wood; Linn tree).

Derivation: Flowers of Tilia ulmifolia and various species of Tilliaceae.

Habitat: Europe and Asia; cultivated in the United States.

Grades; Technical.

Containers: Bags.

Uses: Medicine.

Railroad shipping regulations: None.*

Liniments. Pharmacal preparations intended for external use, of such consistency as to render them conveniently applicable to the skin by gentle friction with the hand. The following liniments are recognized in the Tenth Decennial Revision of the United States Pharmacopoeia: Calcis (lime), camphorae, chloroformi, saponis (soap), saponis molles (soft soap).

Linn Tree. See Linden.

Linnaelte (Cobalt pyrites) Co_3S_4 or $(CoNi)_3S_4$.

Steel-gray metallic mineral with reddish tarnish. Essentially cobalt sulfide but part of the cobalt is nearly always replaced by nickel and to a less extent by iron and copper. Luster, metallic. Does not occur in large amounts.

Constants: Sp.gr. 4.8 to 5; hardness 5.5.

Occurrence: United States (Maryland, Missouri, Nevada), Prussia.

Uses: Source of cobalt and nickel.

Linnen Seed Oil. See Linseed oil.

Linolein. A glyceride of linoleic acid. It is the constituent of linseed oil which induces the drying property.

Linoleum. Oxidized linseed oil, rosin and powdered cork are heated and the mass pressed hot onto canvas. Colors are obtained by mixing pigments in with the mass.

Linoleum Cements. See Cements, linoleum.

Linoxyn. An elastic substance formed as an oxidation product when linseed oil is exposed to the air.

Linseed (Flaxseed; Linum).

Derivation: Ripe seeds of Linum usitatissimum.

Habitat: Cultivated everywhere.

Grades; Technical; U.S.P.

Containers: Bags.

Uses: Source of linseed oil and cake; medicine as a demulcent and emollient.

Railroad shipping regulations: None.*

Linseed Cake. The cakes formed in the presses when the seeds are subjected to hydraulic pressure in order to express the linseed oil. They are used as a cattle food and fertilizer.

Railroad shipping regulations: None.*

Linseed Meal. The mealy form assumed by linseed or flaxseed after the crushing and heating operations preparatory to the expression of the oil in either the hydraulic presses or the expeller. If the oil cake is ground the product again is in this mealy form.

Railroad shipping regulations: None.*

Linseed Oil (Boiled oil; Linnen seed oil; Flaxseed oil).

Color and properties: Golden-yellow, amber or brown oil with peculiar odor and bland taste; thickens on exposure to air, darkening and acquiring pronounced taste; inflammable.

Constants: Sp.gr. 0.9316 to 0.9354; iodine value 170 to 188; saponification value 189 to 195.

Chief constituents: Liquid glycerides (85 to 90%), glycerides of solid fatty acids (10 to 15%). Drying property due to linolein, glyceride of linoleic acid.

Soluble in ether, chloroform, amyl acetate, carbon bisulfide, benzene and turpentine; slightly soluble in alcohol.

Derivation: From the seeds of the flax plant, Linum usitatissimum by expression. The cold pressed oil is golden yellow while the hot pressed product is amber or brown. The latter may be bleached by treating with a solution of ferrous sulfate and exposing it to sunlight.

Habitat: United States, Ireland, northern Europe, Italy, Turkey, India, Argentine, Canada.

Method of purification: Filtration.

Grades: Raw; boiled; double boiled; varnish oil; U.S.P.

Containers: Wooden barrels; tins; tank cars.

Uses: Paints; varnishes; patent leather lacquers; linoleum; rubber substitutes; preparing carron oil.

Railroad shipping regulations. None.*

Linseed Oil, Sulphurated and Terebinthinated. See Haarlem oil.

Linters. Fleecy fibers from one-eighth to one-quarter of an inch in length, which adhere to cottonseed after it has been passed once through a cotton-gin; they are removed from the seed by a second ginning.

Uses: Rayon manufacture; pyroxylin; artificial leather; photographic films; plastics; explosives.

Railroad shipping regulations: None.*

Linum. See Linseed.

Lion's Tooth. See Taraxacum.

Lipobromol. Brominated poppy seed oil. Contains 33% bromine. Used in medicine as a sedative. Unofficial.

Lipoiodine (Diïodobrassidinic acid ethyl esters; Ethyl diïodobrassidate) $CH_3(CH_2)_7CICI(CH_2)_{11}COOH$.

Color and properties: White needles containing 41% iodine. Decomposes slowly in solution yielding free iodine.

Constants: M.p. 37°C.

Soluble in alcohol, ether, chloroform, fatty oils; insoluble in water.

Uses: Medicine (means of administering iodine internally, unofficial).

Railroad shipping regulations: None.*

Lipowitz Metal. See table under Fusible metals.

Liquid Air.

Air which has been subjected to a series of compression, expansion and cooling operations until it reaches a temperature of −189°C. It may be a milky liquid due to the presence of carbon dioxide or transparent and somewhat blue in color if the carbon dioxide is removed.

Uses: Manufacture of oxygen and nitrogen; medicine (local anesthetic, unofficial).

Liquid Amber Orientalis. See Styrax.

Liquid Ammonia. See Ammonia, anhydrous.

Liquid Bronzes. See Bronzing liquid.

Liquid Pitch Oil. Coal-tar creosote (q.v.).

Liquor, Ammonia. See Ammonia liquor.

Liquor Cresolis Compositus, U.S.P.

A cresol-soap disinfectant prepared by heating at 70°C, a mixture of cresol, linseed oil, potassium hydroxide solution, sodium hydroxide solution and water. Phenol coefficient, without organic matter, 3.00, with organic matter, 1.87.

Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Liquores, U.S.P. Solutions. The United States Pharmacopoeia includes in this class of preparations all aqueous solutions of non-volatile substances except such as naturally form separate distinctive classes such as syrups, infusions and decoctions. The following liquores are recognized in the Tenth Decennial Revision of the United States Pharmacopoeia:

Acidi arsenosi, ammonii acetatis, arseni et hydrargyri iodidi (Donovan's solution), calcii hydroxidi (lime water), cresolis compositus, epinephrinae hydrochloridi, ferri chloridi, ferri et ammonii acetatis (Basham's mixture), ferri tersulfatis, formaldehydi, hydrogenii dioxidi, iodi compositus (Lugol's solution), magnesii citras, pituitarii, plumbi subacetatis (Goulard's extract), potassii arsenitis (Fowler's solution), potassii citratis, potassii hydroxidi, sodae chlorinatae (Labarraque's solution), sodae chlorinatae chirurgicalis (modified Dakin's solution), sodii chloridi physiologicus (Physiological or Normal Saline Solution), sodii hydroxidi, zinc chloride.

Liquorice. See Glycyrrhiza.

Litharge (Lead oxide, yellow; Plumbus oxide; Lead protoxide; Lead monoxide; Plumbago).

An oxide of lead corresponding to the formula PbO). In the manufacturing process litharge may be collected in cakes of from 1 to 1.5 tons in weight when it will cool very slowly. The inner part of the cake will swell up and form flakes of red litharge, the outer part, which is necessarily chilled more rapidly, solidifies in lumps of yellow oxide. The flake may be separated from the lump by sifting and marketed as such. The solid material that remains on the screens is ground wet, settled in water and dried. This product is known as levigated litharge. The colors of the commercial grades vary from canary yellow through lemon- to reddish-yellow or red, while a very pure product has the color of yellow ocher. Mechanical compression will turn the pure yellow varieties red. Litharge is soluble in alkalis and acids but insoluble in water. A fine-grained canary-yellow may contain as little as 0.05% insoluble in acetic acid and 0.005% insoluble in nitric acid. Its melting point is given variously as 776°, 879°, 888° and 907°C. Specific gravity figures recorded range from 8.74 to 9.31 as shown by the following table:

Color and Form	Specific Gravity
Red	8.74 at 14°C.
Red, powder	9.09 at 15°C.
Red, crystals	9.125 at 14°C.
Red, crystals	9.126 at 15°C.
Yellow, crystals	9.29 at 15°C.

Grades: There is very little agreement in the industries using litharge as to grades and quality. For this reason manufacturers do not keep special rigid grades for each different industry. Many of the industrial users buy according to their own specifications. There is even considerable variation in the specifications among the different users in the same line of manufacture. It may be obtained in C.P. and U.S.P. grades.

Containers: C.P. and U.S.P.: 1, 5 lb. bottles; 1, 5 lb. cartons; 25, 50 lb. kegs. Technical: 12½, 25, 50, 100, 500 lb. wooden or steel barrels.

Uses: Manufacture of storage batteries, compounding ingredient in rubber manufacture, petroleum, insecticides, varnish, linoleum, glass, pottery and enamel.

Railroad shipping regulations: None.*

See also Massicot.

Lithic Acid. See Uric acid.

Lithiophyllite. A mineral containing lithium-ferromanganese phosphate.

Lithium Li.

Color and properties: Soft, silvery metal; must be kept under naphtha or kerosene.

Constants; Sp.gr. 0.534; m.p. 186°C.; b.p.: Above 1,400°C.

Soluble in acids; decomposes water, setting hydrogen free.

Derivation: By electrolysis of the fused chloride.

Grades: Pure.

Containers: Glass bottles containing kerosene.

Uses: Lithium salts; metallurgical research (alloys with beryllium).

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label(?)*

Lithium Benzoate C_6H_5COOLi

Color and properties: White crystals or powder.

Soluble in water and alcohol.

Derivation: By the action of benzoic acid on lithium hydroxide.

Method of purification: Crystallization.

Grades: Technical; U.S.P.; N.F.

Containers: 5, 10 lb. bottles, 25, 50, 100 lb kegs.

Uses: Medicine (similar to sodium benzoate).

Railroad shipping regulations: None.*

Lithium Birtatrate $LiC_4H_5O_6.H_2O$.

Color and properties: White crystals.

Soluble in water.

Uses: Medicine (treatment of gouty conditions, unofficial).

Railroad shipping regulations: None.*

Lithium Bromide LiBr.

Color and properties: White crystals or granular powder.

Constants: Sp.gr. 3.466; m.p. 442° to 547°C.

Soluble in water, alcohol and ether.

Derivation: By the action of hydrobromic acid on lithium hydroxide with subsequent crystallization.

Method of purification: Recrystallization.

Grades: Technical; U.S.P.; N.F.

Containers: 1, 5 lb. bottles; 25 lb jars; 25, 50, 100 lb. cases.

Uses: Medicine (similar to sodium bromide); photography.

Railroad shipping regulations. None.*

Lithium Carbonate Li_2CO_3.

Color and properties: White chalk-like powder.

Constants: Sp.gr. 2.111; m.p. 618° to 710°C.

Soluble in acids; slightly soluble in water; insoluble in alcohol.

Derivation: By the action of sodium carbonate on a solution of lithium chloride, with subsequent crystallization.

Method of purification; Recrystallization.

Impurities: Lithium chloride; sodium carbonate.

Grades: Technical; C.P.; U.S.P.; N.F.

Containers: 1, 5 lb. bottles; 5, 25, 50 lb boxes; 100 lb. kegs; 250 lb. barrels.

Uses: Medicine (diuretic); mineral waters; preparation of other lithium salts.

Railroad shipping regulations. None.*

Lithium Chloride LiCl.

Color and properties: White crystals.

Constants: Sp.gr. 1.998 to 2.074; m.p. 602°C.

Soluble in water, alcohol and ether.

Derivation: By the action of hydrochloric acid on lithium hydroxide with subsequent crystallization.

Method of purification; Recrystallization.

Grades: Technical; C.P.

Containers: Glass bottles.

Uses: Medicine; mineral waters; soldering aluminum; photography; pyrotechnics.

Railroad shipping regulations: None.*

Lithium Citrate $Li_3C_6H_5O_7.4H_2O$.

Color and properties: White powder or granules.

Constants: m.p.: Decomposes.

Soluble in water; slightly soluble in alcohol.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the action of citric acid on lithium carbonate.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.; N.F.
Containers: 1, 5 lb. bottles; 5, 10, 25, 50 lb. boxes; 100 lb. kegs; 225 lb. barrels.
Uses: Medicine (similar to other citrates); mineral waters.
Railroad shipping regulations: None.*

Lithium Fluophosphate $LiF.Li_3PO_4.H_2O$.
Color and properties: White crystals.
Derivation: By the interaction of lithium fluoride and lithium phosphate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Ceramics.
Railroad shipping regulations: None.*

Lithium Fluoride LiF.
Color and properties: White, crystalline tablets.
Constants: Sp.gr. 2.601; m.p. 801°C.
Soluble in hydrofluoric acid; slightly soluble in water.
Derivation: By the action of hydrofluoric acid on lithium hydroxide.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Enamels.
Railroad shipping regulations: None.*

Lithium Hydroxide LiOH.
Color and properties: White, crystalline powder.
Soluble in water; slightly soluble in alcohol.
Derivation: By the action of water on lithium metal.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Lithium salts; alkaline electrolyte storage batteries.
Railroad shipping regulations: None.*

Lithium Iodide (a) LiI; (b) $LiI.3H_2O$.
Color and properties: (a) White crystals; (b) white crystals.
Constants: Sp.gr. (a) 4.063. M.p. (a) 330° to 446°C.; (b) 72°C.
Soluble in water.
Derivation: By the action of hydriodic acid on lithium hydroxide, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers. Glass bottles.
Uses: Medicine; mineral waters; photography.
Railroad shipping regulations: None.*

Lithium Salicylate $LiC_7H_5O_3$.
Color and properties: White or grayish-white crystals or granular powder; odorless; sweet taste; deliquescent in moist atmosphere.
Soluble in water and alcohol.
Derivation: By heating a solution of salicylic acid and lithium carbonate until effervescence ceases.
Grades: N.F.
Containers: 1 lb. bottles.
Uses: Medicine (for the same purposes as other salicylates but is potent in the treatment of gout and rheumatism).
Railroad shipping regulations: None.*

Lithographic Stone. A fine-grained limestone of uniform texture free from veins and spots. It must be compact enough to take a good polish and yet sufficiently porous to absorb the grease of the draftsman's crayon.

Lithomarge. An amorphous substance resembling clay in composition and in most of its physical properties, but firmer and more compact.

Lithophone. See Lithopone.

Lithopone (Lithophone; Orr's white; Charlton white; Griffith's white).
Color and properties: White powder, consisting of barium sulfate, zinc sulfide and zinc oxide.
Derivation: By mixing solutions of barium sulfide and zinc sulfate, filtering, washing and drying the precipitate. The latter is heated to redness, plunged into water while hot, ground with water, thoroughly washed and dried.
Grades: Technical.
Containers: 50 lb. paper bags; 200 lb. bags; 400, 450, 500, 600 lb. barrels.
Uses: Paint pigment; rubber industry; printers' white ink; pigment in filling white leathers, paper, linoleum, oilcloth and window-shade cloth; face powders, cosmetics, etc.
Railroad shipping regulations: None.*

Lithopone, Cadmium. A lithopone in which cadmium replaces the zinc. Its uses are similar to lithopone (q.v.).

Litmus (Lacmus; Lichen blue).
Color and properties: A blue, amorphous powder (frequently compressed into small cakes or sticks).
Soluble in water.
Derivation: By treating various lichens (particularly Variolaria lecanora and V. rocella) with ammonia and potash and then fermenting the mass.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Indicator in analytical chemistry.
Railroad shipping regulations: None.*

Litmus Milk. Milk which has been tinged with litmus (q.v.).

Litmus Paper. White unsized paper which has been dipped in an infusion of litmus in water. Used as an indicator in analytical chemistry.

Lito-silo. See under Cements, constructional, Magnesium oxychloride cement.

Liver of Sulfur. See Potassium, sulfurated.

Liver Ore. See Cinnabar.

Livers of Antimony. Impure double sulfides of antimony, obtained by heating antimony pentasulfide with alkaline sulfides. Schlippe's salt (sodium sulfantimonate) is the most important.
Railroad shipping regulations: None.*

Liverleaf. See Liverwort.

Liverwort (Hepatica; Liverleaf; Noble liverwort; Kidney liverleaf).
Derivation: The whole plant of Hepatica.
Habitat: Europe.
Grades: Technical.
Containers: Bales.
Uses: Medicine.
Railroad shipping regulations: None.*

Livingstonite $HgSb_4S_7$ or $HgS.2Sb_2S_3$.
Lead-gray mineral, metallic luster, red streak. Contains 24.8% mercury, 53.1% antimony, 22.1% sulfur. Resembles stibnite (q.v.) in form.
Constants: Sp.gr. 4.1 to 4.8; hardness 2.
Occurrence: Mexico.
Uses: Source of mercury.

Lobelia (Indian or wild tobacco; Asthma weed).
Dried leaves and tops of Lobelia inflata.
Habitat: United States and Canada.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (respiratory stimulant and an expectorant).
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Lobeline $C_{18}H_{23}NO_2$.
Color and properties: Yellow, honey-like liquid; poisonous!
Soluble in alcohol and chloroform; slightly soluble in ether.
Derivation: By extraction from the seeds of Lobelia inflata.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Locomotive Headlight Oil. See Burning oils, mineral.

Lodestone. See Magnetite.

Logwood (Hematoxylon).
Derivation: The heartwood of Hematoxylon campechianum. The raw logwood comes in the form of rough logs, 3 feet long, which are either ground or rasped into small chips. These chips after being aged by being exposed to the atmosphere, are subjected to extraction.
Habitat: Central America and West Indies.
Uses: Textile and leather dyeing; medicine (mild astringent).
Railroad shipping regulations: None.*

Logwood Crystals.
Derivation: By concentrating logwood liquor in evaporating pans and by crystallizing.
Grades: Technical, sold on basis of tinctorial value.
Containers: 350-400 lb. wooden barrels.
Uses: Textile and leather dyeing.
Railroad shipping regulations: None.*

Logwood Extract.
Derivation: By concentrating logwood liquor in vacuum pans until it reaches a sp.gr. of 1.25 (50°Tw).
Grades: Technical, sold on basis of tinctorial value.
Containers: Wooden barrels.
Uses: Textile and leather dyeing.
Railroad shipping regulations: None.*

Logwood Extract, Solid.
Derivation: By evaporating logwood extract to dryness.
Grades: Technical, sold on basis of tinctorial value.
Containers: Wooden boxes of various sizes from 15-60 lb.
Uses: Textile and leather dyeing.
Railroad shipping regulations: None.*

Logwood Liquor.
Derivation: An unstable decoction of logwood obtained by extracting the chips with water. It usually has a strength of 15°Tw. (Sp.gr. 1.075.)
Grades: Technical.
Containers: 500-550 lb. wooden barrels.
Uses: Textile and leather dyeing.
Railroad shipping regulations: None.*

Loja Bark. See Cinchona bark, loxa.

Löllingite (Leucopyrite)
Fe_3As_4 to $FeAs_2$, sometimes with Co, Ni, Au or S. Silver-white or gray mineral with grayish-black streak and metallic luster. Contains 67% arsenic, about 2% sulfur, cobalt up to 6.4%.
Constants: Sp.gr. 7 to 7.4; hardness 5 to 5.5.
Occurrence: Germany, Switzerland, Austria.
Uses: White arsenic, arsenic and the sulfide.

Lomite No. I.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class B.
Characteristic ingredient: Class 2.
Railroad shipping regulations: High explosive. See Explosives, permissible.

London White. See White, Cremnitz.

Longwort. See Pyrethrum root.

Loranskite. See Euxenite.

Losophan (Cresol triïodide) $CH_3C_6HI_3OH$. An iodide of cresol containing a larger percentage of iodine than iodocresol (q.v.). Used in medicine for similar purposes.
Railroad shipping regulations: None.*

Louisville Cement. See under Cements, structural.

Lovage (Levisticum; Sea parsley; Ligusticum).
Derivation: Whole plant of Levisticum officianale.
Habitat: Southern Europe.
Grades: Technical.
Containers: Bales.
Uses: Medicine.
Railroad shipping regulations: None.*

Lovage Oil (Levisticum oil).
Color and properties: A colorless oil; characteristic odor.
Constants: Sp.gr.: Root oil, 1.00 to 1.049; fruit oil, 0.935; herb oil, 0.928.
Soluble in alcohol, ether, chloroform, carbon bisulfide; acetone and benzene.
Derivation: Distilled from the root, fruit or herb of Levisticum officianale.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; copper flasks.
Uses: Perfumes.
Railroad shipping regulations: None.*

Loxa Bark. See Cinchona bark, loxa.

Lubricants. See Airplane oils; Automobile oils; Axle oils, railroad; Batching oils; Black oils; Bolt oils; Car oils, railroad; Compounded oils; Compressor oils, air; Crank case oils; Cream-separator oils; Crusher oils; Cylinder stocks; Die oils; Dynamo oils; Engine oils; Gas-engine oils; Gear-case oils; Hydraulic-press oils; Ice-machine oils; Lubricants, United States Government Master Specifications; Mine-machine oils; Paraffin oils; Pneumatic tool oils; Reduced oils; Screw-cutting oils; Spindle oils; Steam-hammer oils; Summer black oils; Thread-cutting oil; Transformer oils; Transmission oils; Turbine oils.

Lubricants, United States Government Master Specifications.
The following specifications are taken from "United States Government Master Specifications for Lubricants and Liquid Fuels."
Class A: Grades of petroleum oil used by the United States Government for general lubrication of engines and machinery where a highly refined oil is not required. Not to be used for steam-cylinder lubrication. Only refined petroleum oils without admixture of fatty oils, resins, soaps, etc., are considered. Five grades: Extra light, light, medium, heavy and extra heavy.

	Flash Point °F.	Fire Point °F.	Viscosity at 100°F. Sec.	A.S.T.M. Color	Pour Point (not above) °F.
Extra light.	315	355	135-165	7	35
Light	325	365	180-220	7	35
Medium ...	335	380	270-330	7½	40
Heavy	345	390	360-440	8	45
Extra heavy	355	400	450-550	8	50

Reaction: No acid reaction.
Corrosion: A clean copper strip shall not be dis-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

colored when submerged in the oil for 3 hours at 212°F.

Class B: Grades used for lubrication of turbines, dynamos, and high speed steam engines using circulating and forced-feed systems. The standards for flash point, fire point, viscosity color and pour point are identical with those given in the table under Class A.

Corrosion: A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212°F.

Emulsion test: Oil shall separate in 30 minutes from an emulsion with normal NaOH solution and the upper layer at end of 30 minutes shall not contain more than 10% water.

Class C: Grades used by United States Government when, and only when, service conditions necessitate an oil suitable for lubricating both turbine and internal combustion engines. The standards for flash point, fire point, viscosity, color and pour point are identical with those given in the table under Class A.

Neutralization: Not more than 0.10 mg. of KOH to neutralize 1 gm. of oil.

Corrosion: A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212°F.

Emulsion test: Oil shall separate in 30 minutes from an emulsion with (1) distilled water; (2) 1% salt solution; (3) normal caustic solution.

Carbon residue: Shall not exceed the following: Extra light, 0.10%; light, 0.20%; medium, 0.45%; heavy, 0.55%; extra heavy, 0.70%.

Class D: For lubrication of internal combustion engines, except aircraft and Diesel engines.

	Flash Point °F.	Fire Point °F.	Viscosity at 100°F. Sec.	A.S. T.M. Color	Pour Point (not above) °F.
Extra light..	315	355	135-165	7	35
Light	325	365	180-220	7	35
Medium	335	380	270-330	7½	40
Heavy	345	390	360-440	8	45
Extra heavy.	355	400	450-550	8	50

	Flash Point °F.	Fire Point °F.	Viscosity at 210°F. Sec.	A.S. T.M. Color	Pour Point (not above) °F.
Ultraheavy..	360	410	55-65	5 †	50
Tractor	380	430	75-85	6 †	50
Tractor heavy	390	440	90-100	7 †	50
Motor cycle.	400	450	110-120	8 †	50

† Diluted to 15% oil, 85% kerosene.

Neutralization: Not more than 0.30 mg. KOH to neutralize 1 gm. oil.

Corrosion: A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212°F.

Carbon residue: Shall not exceed the following: Extra light, 0.10%; light, 0.20%; medium, 0.45%; heavy, 0.55%; extra heavy, 0.70%; ultraheavy, 0.80%; tractor, 1.50%; tractor heavy, 1.75%; motor cycle, 2.00%.

Types of lubricants follow:

Car and locomotive engine oil. Lubricant on journals of all cars, passenger coaches, and steam and electric locomotives.

Physical characteristics: Flash point not lower than 300°F.; viscosity at 210°F. 65 to 75 seconds; pour point not above 45°F.; precipitation not greater than 0.5.

Diesel-engne lubricating oil.

Physical characteristics: Flash point not lower than 360°F.; viscosity at 210°F. 55 to 65 seconds; pour point not above 45°F.

Neutralization: Not more than 0.30 mg. KOH to neutralize 1 gm. of the oil.

Emulsion: Oil shall separate completely in 1 hour from an emulsion with distilled H_2O at 180°F.

Carbon residue: Not greater than 0.80%.

Gear, chain and wire-rope lubricant. For chains, wire ropes, and gears of cranes, dredges, steam shovels and all other heavy equipment.

Physical characteristics: Viscosity at 210°F. 90 to 1,100 seconds.

Protection: When applied to a plate of polished steel the lubricant shall protect the steel for a period of 30 days when immersed in a 10% salt solution.

Transmission oil. For transmission gears and bearings, differential gears, worm drives, winch drives and roller and ball bearings used in connection with such parts of the equipment of motor vehicles.

Physical characteristics: Ash not exceed 0.2%; viscosity at 210°F. 135 to 165 seconds.

Compounded marine-engine oil. For reciprocating steam engines in marine service where compounded engine oil is needed. These oils must not be used in circulating or forced-feed systems.

Grades: Grade 1 is compound of refined petroleum oil and 10 to 20% blown refined rapeseed oil or blown refined peanut oil, so compounded that it will not separate or break down in any way either before or while it is in service; Grade 2 is compound of refined petroleum oil and 10 to 20% of blown refined rapeseed oil or an oil of equivalent tests and shall have an emulsifying value equivalent to that of rapeseed compounded oil.

Physical characteristics: Viscosity of both grades at 210°F. 65 to 75 seconds; at 100°F. not over 850 seconds; pour point, grade 1 not over 35°F.; grade 2 not over 45°F.

Neutralization: Oil shall not contain more than 1.50% of acid calculated as oleic acid.

Corrosion: A clean copper strip shall not be discolored when submerged in the oil for 3 hours at 212°F.

Emulsion: Oil shall remain completely emulsified for 1 hour when the emulsifying liquid is (1) distilled water, (2) 1% salt solution.

Wick feed: Flow during fourteenth day shall be at least 30% of flow during the second 24-hour period.

Marine-engine oil. Only one grade. For reciprocating steam engines in marine service. Shall not be used in circulating or forced-feed systems. Shall be a mineral lubricating oil free from water, mineral acids, alkalis, and asphaltic matter.

Physical characteristics: Viscosity at 210°F. 65 to 70 seconds; pour point not above 35°F. (1.7°C.); flash point not below 345°F (173.9°C.); fire point not below 390°F. (198.0°C.).

Neutralization: Not more than 1.0 mg. KOH to neutralize 1 gram of oil.

Corrosion: A clean copper strip shall not show more than extremely slight discoloration when submerged in the oil for 3 hours at 212°F. (100°C.).

Emulsion test: Oil shall remain completely emulsified for ½ hour when the emulsifying liquid is (a) distilled water, (b) 1% salt solution.

Wick feed: Flow during fourteenth day shall be at least 30% of flow during the second 24-hour period.

Lubricating Oils. See Lubricants.

Luccu Oil. Olive oil.

Lugol Solution. See Potassium iodide.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Lumbang Oil (Candle-nut oil).
Color and properties: A limpid, colorless or yellowish liquid; pleasant odor; bland taste.
Constants: Sp.gr. 0.923; saponification value 184 to 192; iodine value 163.7.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: From the candle-nut, the seed of Aleuritis moluccana, by expression.
Method of purification: Filtration.
Grades: Crude; refined.
Containers: Wooden barrels.
Uses: Illuminant; paints; caulking; soap manufacture.
Railroad shipping regulations: None.*

Luminal (Phenylbarbital; Phenylethylbarbituric acid; Phenylethylmalonylurea; Phenobarbital) $CO(NHCO)_2C(C_2H_5)(C_6H_5)$.
Color and properties: White, shining, crystalline powder, odorless, stable. Toxic unless properly used.
Constants: M.p. 172° to 174°C.
Soluble in alcohol, ether, chloroform, benzene, alkali hydroxides, alkali carbonate solutions, sparingly soluble in water.
Derivation: Condensation of phenylethylmalonic acid derivatives and urea, or urea compounds from cyanoacetic acid.
Uses: Medicine (epilepsy, general nerve sedative).
Railroad shipping regulations: None.*

Lunar Caustic. See Silver nitrate, fused.

Lunosol (Silver chloride, colloidal).
Color and properties: White, granular powder, odorless, sweet, metallic taste. A silver chloride-sucrose preparation containing 10% colloidal silver chloride.
Soluble in water.
Grades: N.N.R.
Uses: Medicine (antibacterial, unofficial).
Railroad shipping regulations: None.*
See also Silver, colloidal.

Lupanine $C_{15}H_{24}N_2O$.
Color and properties: White, crystalline alkaloid; poisonous!
Constants: M.p. 44°C.
Soluble in water, alcohol and ether.
Derivation: From the seeds of Lupinus albus and Lupinus angustifolius.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Lupetazine (Dimethylpiperazine; Dipropylenediamine) $NH(C_2H_3CH_3)_2NH$.
Color and properties: Colorless, oily liquid.
Constants: B.p. 153° to 158°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the reduction of dimethylpyrazine with alcoholic sodium.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Organic synthesis; medicine.
Railroad shipping regulations: None.*

Lupinine $C_{10}H_{19}ON$.
Color and properties: White, crystalline alkaloid; poisonous!
Constants: M.p. 68.5° to 69.2°C.; b.p. 255° to 257°C.
Soluble in alcohol, ether, acetone and chloroform; decomposed by water.
Derivation: By extraction from the seeds of Lupinus luteus and Lupinus niger.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Lupulin.
Derivation: Glandular trichomes separated from fruit of Humulus lupulus.
Habitat: Europe, Asia and North America.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (similar to hops).
Railroad shipping regulations: None.*

Lustrose. The proprietary name of a compound used in the textile trade for sizing.

Lutecia. See Rare earths.

Lutecium Lu. One of the rare earth (q.v.) metals.

Luzonite. See Enargite.

Lycetol (Dimethylpiperazine tartrate) $NH(CH_2CHCH_3)_2NHC_4H_6O_6$.
Color and properties: White powder, pleasant acidulous taste.
Constants: M.p. 250°C.
Soluble in water.
Uses: Medicine (strong diuretic, purulent cystitis, chronic and active gout, other forms of uric acid diathesis, calculi solvent, unofficial).
Railroad shipping regulations: None.*

Lycopodium (Club-moss; Vegetable sulfur).
Color and properties: Fine yellow powder.
Derivation: Spores of Lycopodium clavatum (club moss).
Habitat: North America, Asia and Europe.
Grades: Technical; U.S.P.
Containers: Boxes.
Uses: Pharmacy (dusting powder).
Railroad shipping regulations: None.*

Lycorine $C_{32}H_{32}N_2O_8$.
Color and properties: Yellow crystals; poisonous!
Constants: M.p. 208°C.
Slightly soluble in water, alcohol and ether.
Derivation: By extraction of Lycoris radiata.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Lydian Stone (Lydite; Touchstone; Basanite).
A velvet-black form of quartz (q.v.) closely allied to or grading into chert, jasper or flint.
Uses: Testing quality of precious metals (the metal tested is rubbed on the Lydian stone and the mark is checked against others made by alloys of predetermined composition).

Lydite. See Lydian stone.

Lye. See sodium hydroxide and potassium hydroxide.

Lykopon. Trade name for a product used in the dyeing industry for reducing indigo and vat dyes.

Lysargin.
Color and properties: Steel-blue lustrous scales, a colloidal silver preparation containing 60% metallic silver. Stable in air and daylight but decomposed by sunlight.
Soluble in water.
Uses: Medicine (antibacterial, gonorrhea, unofficial).
Railroad shipping regulations: None.*
See also Silver, colloidal.

Lysidine (Methylglyoxalidine; Ethyleneëthenyldiamine) $CH_3CNCH_2CH_2NH$.
Color and properties: Pinkish, hygroscopic crystals; mousy odor.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: M.p. 105° to 106°C.; b.p. 198° to 200°C.
Soluble in water, alcohol and ether.
Derivation: From ethylenediamine hydrochloride and sodium acetate by dry distillation, decomposing the hydrochloride of the new base with concentrated potassium hydroxide and crystallizing.
Method of purification: Recrystallization.
Grades: Technical; 50% solution.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Lysol.
Color and properties: Brown, oily liquid; creosote odor; poisonous! Phenol coefficient without organic matter 2.12, with organic matter 1.57.
Constants: Sp.gr. 1.042.
Soluble in water, alcohol, ether, chloroform and benzene.
Derivation: A mixture of alkali compounds of the higher phenols with fat and resin soaps, obtained by boiling a mixture of heavy tar-oils, fats and resin with alkali.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Disinfectant; germicide.
Railroad shipping regulations: None.*

Lytta. See Cantharides.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

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M Acid. 1-Amino-5-naphthol-7-sulfonic acid.

Macaranga Kino.
Color and properties: Odorless, tasteless tears or irregular masses.
Derivation: From Macaranga roxburghii Wright.
Uses: Medicine [similar to Kino (q.v.)].

Macassar Gum. See Agar-agar.

Mace.
The coating (arillus) of nutmeg seeds (Myristic fragans).
Habitat: Molucca Islands; cultivated in the tropics and East Indies, Ceylon, South America, India and Philippine Islands.
Grades: Technical.
Containers: Boxes.
Uses: Medicine; condiment.
Railroad shipping regulations: None.*

Mace Oil.
Color and properties: Colorless or pale yellowish liquid; agreeable, aromatic odor, resembling oil of nutmeg.
Chief known constituents: Pinene, dipentene, myristicol and myristicin.
Constants: Sp.gr. 0.91 to 0.93; optical rotation +10°.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from mace.
Grades: Technical.
Containers: Copper flasks; glass bottles.
Uses: Flavoring; perfumery.
Railroad shipping regulations: None.*

Mackintoshite. A natural hydrous uranium-thorium silicate. Found in Texas.

Mack's Cement. See under Cements, structural.

Maclurin $C_{13}H_{10}O_6$.
Color and properties: Colorless needles. One of the two coloring principles of old fustic (q.v.).
Constants: M.p. 200°C.
Soluble in alkaline solutions. More soluble in water than morin (q.v.).
Derivation: By extraction from an extract of old fustic after morin has been precipitated.

Macquer's Salt. Potassium arsenate.

Macrotin. See Cimicifugin.

Madder (Gamene).
Derivation: Pulverized root of Rubia tinctorum, a plant formerly cultivated in Europe and Asia Minor. The glucosides contained therein, when decomposed by fermentation yield alizarin, now largely replaced by alizarin obtained from the anthracene oil of coal-tar.
Containers: 50, 100, 200, 400, 500 lb. barrels.

Madras Kino. See Kino.

Magell. See Mezereum.

Magenta. See Fuchsine.

Magic Stone. See under Opal, Hydrophane.

Magister of Bismuth. See Bismuth subnitrate.

Magister of Lead. White lead (q.v.).

Magister of Sulfur. Sulfur precipitated by acids from solutions of hyposulfites or polysulfides. It is in the amorphous form.

Magma. In medicine, a class of preparations in which finely divided, freshly precipitated, insoluble, inorganic hydroxides are suspended in water to form a viscous, opaque mixture which may settle out on standing. Magmas of bismuth, magnesium and iron are used, commonly called milk of bismuth, milk of magnesia, etc.

Magnalium. An alloy of aluminum and magnesium.

Magnesia. See Magnesium oxide.

Magnesia Alba. See Magnesium carbonate.

Magnesia, Burnt. See Magnesium oxide.

Magnesia, Calcined. See Magnesium oxide.

Magnesia, Calcined, Heavy. See Magnesium oxide.

Magnesia, Calcined, Light. See Magnesium oxide.

Magnesia Cement. See under Cements, structural, Magnesium oxychloride cement.

Magnesia, Heavy. See Magnesium oxide.

Magnesia, Light. See Magnesium oxide.

Magnesia Mixture. One part each of ammonium chloride and magnesium sulfate dissolved in 8 parts of water to which 4 parts of ammonia, of sp.gr. 0.96, are added and the whole filtered. Used in determination of phosphorus in manures.

Magnesia "Norton." Trade mark for a line of electrically fused magnesia products.
Grain: Approximately 96½% pure MgO. Slight amounts of lime, silica, iron are present. Used as furnace insulation and in mixtures for tamping linings for furnaces for melting copper, copper alloys and iron.
Cements: MgO content very high. Forms dense body when tamped. Used for furnace linings and crucibles for melting copper, copper alloys, iron and steel.
Refractory Bonded Shapes: Basic refractories for use in contact with basic metals and slags. Principally supplied in the form of bricks and crucibles.

Magnesite $MgCO_3$.
A natural magnesium carbonate. Color, white, yellowish, grayish-white, brown; white streak; dull, vitreous or silky luster. Contains 44.53 to 46.77% MgO, 49.94 to 51.79% CO_2. Breunnerite (brown spar) contains from 5 to 30% $FeCO_3$ replacing part of the $MgCO_3$.
Constants: Sp.gr. 3 to 3.12; hardness 3.5 to 4.5.
Occurrence: United States (California, Washington), Austria, Greece.
Grades: Raw; broken; burnt; calcined.
Containers: Casks; kegs; barrels; bulk.
Uses: Chemicals (magnesium salts, production of carbon dioxide on a large scale); cements; refractories; ferromagnesium; artificial stone flooring; metallurgy; whitening paper pulp and wool; paint filler.

Magnesium Mg.
Color and properties: Silvery, malleable, moderately hard metal. Oxidizes and tarnishes in moist air but is stable in dry air. In finely divided form can be ignited and burns with an intense white light. The solid form is permanent and must be heated above its melting point before it will burn.
Constants: Sp.gr. 1.69 to 1.75; m.p. 650°C.; b.p. 1,120°C.
Soluble in acids; insoluble in water.
Derivation. By electrolysis of fused carnalite or magnesite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Distillation.
Forms available: 1⅛″ to 1$\frac{5}{16}$″ ingots; ½″ x ½″ to 1″ x 1″ square bars; 50, 100 to 150 mesh powder; sheet and plate; rod; tubing; ribbon; castings.
Containers: Metal: 100 lb. boxes. Powder: 100 lb. cylindrical sheet-iron containers.
Uses: Pyrotechnics; photographic flash-light powder, ribbon and sheets; magnesium salts; alloyed with lead for production of hydrogen; metallurgy (alloys, deoxidizing and desulfurizing agent, manufacture of nickel); substitute for zinc in toxicological analyses; ceramics; substitute for zinc in dry batteries to give higher e.m.f.; organic synthesis; manufacture of precision instruments; optical mirrors.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label, when the metal is in powder form.

Magnesium Alba. See Magnesium carbonate.

Magnesium-ammonium Phosphate (Magnesium-ammonium ortho-phosphate) $MgNH_4PO_4.6H_2O$.
Color and properties: White powder.
Constants: Sp.gr. 1.71; m.p.: Decomposes.
Soluble in acids; insoluble in alcohol and water.
Derivation: By the interaction of solutions of a magnesium salt and ammonium phosphate.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium-ammonium Ortho-phosphate. See Magnesium-ammonium phosphate.

Magnesium Benzoate $Mg(C_7H_5O_2)_2$.
Color and properties: White crystalline powder.
Moderately soluble in water and alcohol.
Uses: Medicine (treatment of gout and tuberculosis, unofficial).
Railroad shipping regulations: None.*

Magnesium Biphosphate (Magnesium phosphate, monobasic; Acid magnesium phosphate; Magnesium-tetrahydrogen phosphate) $MgH_4(PO_4)_2$.
Color and properties: Yellowish, crystalline powder.
Soluble in acids; insoluble in water and alcohol.
Derivation: By the action of ortho-phosphoric acid on magnesium hydroxide.
Grades: Technical.
Containers: Boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Borate $3MgO.B_2O_3$.
Color and properties: Transparent, colorless crystals.
Soluble in inorganic acids; insoluble in water and acetic acid.
Derivation: By heating magnesium oxide, boric anhydride and potassium hydrogen fluoride.
Uses: Preservative.
Railroad shipping regulations: None.*

Magnesium Borocitrate $Mg(BO_2)_2.Mg_3(C_6H_5O_7)_2.Aq$.
Color and properties: White powder or small, white, lustrous scales.
Soluble in water.
Derivation: By mixing magnesium borate and magnesium citrate.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Bromate $Mg(BrO_3)_2.6H_2O$.
Color and properties: White crystals or crystalline powder.
Constants: Sp.gr. 2.29; m.p. ($6H_2O$) 200°C.; b.p.: Decomposes.
Soluble in water; insoluble in alcohol.
Derivation: By adding magnesium sulfate to a solution of barium bromate.
Method of purification: Recrystallization.
Grades: Pure; reagent.
Containers: Glass bottles; 25 lb. tin boxes.
Uses: Analytical reagent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Magnesium Bromide $MgBr_2.6H_2O$.
Color and properties: Colorless, very deliquescent crystals; bitter taste.
Constants: M.p.: Decomposes.
Soluble in water; slightly soluble in alcohol.
Derivation: By the action of hydrobromic acid on magnesium oxide with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium-calcium Chloride. See Calcium-magnesium chloride.

Magnesium Carbonate (Light magnesium carbonate; Magnesia alba; Magnesia alba levis)
(a) $MgCO_3$;
(b) given variously as $5MgCO_3.Mg(OH)_2.3H_2O$; $5MgCO_3.2Mg(OH)_2.7H_2O$; $4MgCO_3.Mg(OH)_2$.
Color and properties: Very light, white powder, consisting of a mixture of crystals and amorphous particles.
Constants: Sp.gr. (a) 3.04; (b) 1.808; m.p. (a) Decomposes at 350°C.
Soluble in acids; insoluble in water.
Derivation: (a) Found as such in nature (magnesite); (b) by mixing solutions of magnesium sulfate and sodium carbonate, boiling, filtering, washing and drying.
Method of purification: Washing.
Grades: Technical; U.S.P.
Containers: 50 lb. cases (1 lb. containers); 30 lb. paper-lined kegs; 70 lb. paper-lined barrels; 50 or 100 lb. paper-lined bags.
Uses: Insulation; magnesium salts; rubber pigments; varnish manufacture; magnesia inks; high-grade glass articles such as "Pyrex"; pharmaceuticals; dentifrices; shaving creams; talcum powder; cosmetics; free-running table salts.
Railroad shipping regulations: None.*

Magnesium Carbonate, Basic (Heavy magnesium carbonate; Magnesia alba; Magnesia alba ponderosa). Formula given variously as $3MgCO_3.Mg(OH)_2.4H_2O$; $4MgCO_3.Mg(OH)_2.5H_2O$.
Color and properties: White, granular powder.
Constants: Sp.gr. 2.18.
Soluble in dilute acids; insoluble in water.
Derivation: By mixing solutions of magnesium sulfate and sodium carbonate, evaporating to dryness, digesting with water, filtering, washing and drying.
Method of purification: Washing.
Grades: Technical; C.P.; U.S.P.
Containers: 1 lb. bottles; 50 lb. paper-lined kegs; 150 lb. paper-lined barrels; 100 lb. paper-lined bags.
Uses: Conflicting reports received on this product, the majority indicating that the form most generally used is the "light carbonate."
Railroad shipping regulations: None.*

Magnesium Carbonate, Heavy. See Magnesium carbonate, basic.

Magnesium Carbonate, Light. See Magnesium carbonate.

Magnesium Chloride (a) $MgCl_2$; (b) $MgCl_2.6H_2O$.
Color and properties: Colorless or white crystals; deliquescent.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants:	(a)	(b)
Specific gravity	2.177	1.569
Melting-point	708°C	Loses $2H_2O$ at 100°C
Boiling-point	Red heat	Decomposes

Soluble in water and alcohol.
Derivation: (a) By heating magnesium-ammonium chloride; (b) By the action of hydrochloric acid on magnesium oxide.
Method of purification: Recrystallization.
Grades: Technical (crystals, fused, flakes, granulated); C.P.; N.F.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 100 lb. bags; 350, 575, 700 lb. drums; 600, 900 lb. barrels.
Uses: Magnesium salts; disinfectants; fire extinguishers; fireproofing wood; magnesium cement; refrigerating brines; ceramics; chilling drilling tools in drilling for saline deposits and to prevent the dissolution of salts; textiles (size, dressing and filling of cotton and woolen fabrics, thread lubricant; carbonization of wool); paper manufacture; road dust-laying compounds; floor-sweeping compounds.
Railroad shipping regulations: None.*

Magnesium Citrate $Mg_3(C_6H_5O_7)_2.14H_2O$.
Color and properties: White scales.
Soluble in water and acids.
Derivation: By the action of citric acid on magnesium hydroxide.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: Wooden kegs; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Dust. Finely divided magnesium metal used in pyrotechnics, photographic flash-lights and chemical preparations. See also Magnesium.
Railroad shipping regulations: Yellow label.

Magnesium Fluoride MgF_2.
Color and properties: White crystals.
Constants: Sp.gr. 2.472; m.p. 1,396°C.
Soluble in nitric acid; insoluble in alcohol and water.
Derivation: By adding sodium fluoride or hydrofluoric acid to a solution of magnesium salt.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Ceramics.
Railroad shipping regulations: None.*

Magnesium Fluosilicate. See Magnesium silicofluoride.

Magnesium Formate $Mg(CHO_2)_2.2H_2O$.
Color and properties: Colorless crystals.
Soluble in water; insoluble in alcohol and ether.
Derivation: By the action of formic acid on magnesium oxide.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Analytical chemistry; medicine.
Railroad shipping regulations: None.*

Magnesium Glycerinophosphate. See Magnesium glycerophosphate.

Magnesium Glycerophosphate (Magnesium glycerinophosphate) $MgPO_4.C_3H_5(OH)_2$.
Color and properties: Colorless powder.
Soluble in water.
Derivation: By the action of glycerophosphoric acid on magnesium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1, 5 lb. bottles; 5, 10, 25 lb. cans.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Hydrate. See Magnesium hydroxide.

Magnesium-hydrogen Phosphate. See Magnesium phosphate.

Magnesium Hydroxide (Magnesium hydrate) $Mg(OH)_2$.
Color and properties: White powder.
Constants: Sp.gr. 2.36; m.p.; Decomposes.
Soluble in solutions of ammonium salts; slightly soluble in water.
Derivation: By precipitation from a solution of a magnesium salt by sodium hydroxide.
Grades: Technical; medicinal.
Containers: Wooden barrels.
Uses: Sugar refining; magnesium oxide; medicine (cathartic).
Railroad shipping regulations: None.*

Magnesium Hypophosphite $Mg(H_2PO_2)_2.6H_2O$.
Color and properties: White crystals.
Soluble in water; insoluble in alcohol and ether.
Derivation: By the action of hypophosphoric acid on magnesium oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Iodide $MgI_2.8H_2O$.
Color and properties: White, deliquescent, crystalline powder.
Constants: M.p.: Decomposes.
Soluble in water, alcohol and ether.
Derivation: By heating magnesium in iodine vapors.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Lactate $Mg(C_3H_5O_3)_2.3H_2O$.
Color and properties: White crystals; very bitter taste.
Soluble in water; insoluble in alcohol and ether.
Derivation: By the action of lactic acid on magnesium oxide, with subsequent crystallization.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Lactophosphate (Magnesium phospholactate).
Color and properties: White powder, containing 45% of magnesium lactate.
Soluble in water.
Derivation: By mixing magnesium lactate and magnesium phosphate, dissolving and crystallizing.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Limestone. See Limestone.

Magnesium Nitrate $Mg(NO_3)_2.6H_2O$.
Color and properties: White crystals.
Constants: Sp.gr. 1.464; m.p. 90°C.
Soluble in water and alcohol.
Derivation: By the action of nitric acid on magnesium oxide, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden barrels.
Uses: Pyrotechnics.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Magnesium Oleate $Mg(C_{18}H_{33}O_2)_2$.
Color and properties: Yellowish mass.
Soluble in linseed oil; insoluble in water.
Derivation: By the interaction of magnesium chloride and sodium oleate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Wooden kegs.
Uses: Varnish driers.
Railroad shipping regulations: None.*

Magnesium Oxide [Magnesia; Light magnesia; Burnt magnesia; Heavy magnesia; Heavy calcined magnesia (magnesia usta ponderosa); Light calcined magnesia (magnesia usta levis)] MgO.
Color and properties. White powder, either light or heavy depending on whether it is prepared by heating magnesium carbonate or basic magnesium carbonate.
Constants: Sp.gr. 3.22; m.p. 2,800°C.
Soluble in acids and ammonia salts, insoluble in water.
Derivation: By calcining magnesium carbonate or basic magnesium carbonate.
Impurities: Carbonate.
Grades: Technical; C.P.; U.S.P.
Containers: 1 lb. bottles; 1, 5, 25, 50 lb. cans; wooden barrels.
Uses: Medicine (antacid); heat insulation; pipe coverings; refractories; rubber industry; sorel cement; powdered oils; fat splitting; fertilizers for beet sugar; glass; metallurgy; substitute for platinum in the form of rods; paper manufacture; face powders; stain remover when mixed with benzene.
Railroad shipping regulations: None.*

Magnesium Oxide, Heavy. See Magnesium oxide.

Magnesium Oxide, Light. See Magnesium oxide.

Magnesium Oxychloride. See under Cements, structural, Magnesium oxychloride cement.

Magnesium Oxychloride Cement. See under Cements, structural.

Magnesium Perborate MgB_4O_7.
Color and properties: White powder.
Soluble in water.
Derivation: By the action of boric acid on magnesium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dryers.
Railroad shipping regulations: None.*

Magnesium Perhydrol. See Magnesium peroxide.

Magnesium Peroxide (Magnesium perhydrol) MgO_2.
Color and properties: White powder.
Soluble in acids; insoluble in water.
Derivation: From sodium or barium peroxide with magnesium sulfate in a concentrated solution.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron drums.
Uses: Bleaching woolen and silk fabrics; antiseptic; general bleaching and oxidizing agent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Magnesium Phosphate (Dimagnesium ortho-phosphate; Dimagnesium phosphate; Magnesium-hydrogen phosphate; Dibasic magnesium phosphate) $MgHPO_4.3H_2O$.
Color and properties: White, crystalline powder.
Constants: Sp.gr. 2.123.
Soluble in acids; slightly soluble in water.
Derivation: By the action of meta-phosphoric acid on magnesium oxide.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Phosphate, Acid. See Magnesium biphosphate.

Magnesium Phosphate, Dibasic. See Magnesium phosphate.

Magnesium Phosphate, Monobasic. See Magnesium biphosphate.

Magnesium Phospholactate. See Magnesium lactophosphate.

Magnesium Salicylate $Mg(C_7H_5O_3)_2.4H_2O$.
Color and properties: Colorless, crystalline powder.
Soluble in water.
Derivation: By the action of salicylic acid on magnesium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium Silicate (Talcum) $3MgSiO_3.5H_2O$.
Color and properties: Fine, white powder.
Insoluble in water or alcohol.
Derivation: By the interaction of a magnesium salt and a soluble silicate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Medicine; rubber industry; ceramics; glass; refractories; manufacture of permanently dry resins and resinous compositions; paints and varnishes (filler); animal and vegetable oils (bleaching agent).
Railroad shipping regulations: None.*

Magnesium Silicofluoride (Magnesium fluosilicate) $MgSiF_6$.
Color and properties: White, crystalline powder.
Derivation: By acting on magnesium hydroxide or carbonate with hydrofluosilicic acid.
Grades: Technical.
Containers: Crystals: 400 lb. barrels. Solution: 400 lb. barrels.
Uses: Ceramics; concrete hardeners.
Railroad shipping regulations: None.*

Magnesium Sulfate (Epsom salt) (a) $MgSO_4$; (b) $MgSO_4.7H_2O$.
Color and properties: Colorless crystals.
Constants: Sp.gr. (a) 2.65; (b) 1.6784.
Soluble in glycerol; sparingly soluble in water.
Derivation: (a) By the action of sulfuric acid on magnesium oxide, hydroxide or carbonate. (b) Mined in a high degree of purity in British Columbia; occurs impure in Germany as kieserite.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; various tins; 10, 25, 50 lb. boxes; 100, 112, 125 lb. kegs; 250, 300, 360, 400, 440 lb. barrels.
Uses: Medicine (cathartic); leather industry; fireproofing; textiles (warp-sizing cotton goods, loading cotton goods, weighting silk, dyeing and calico printing); mineral waters; motion-picture snow; ceramics; explosives; matches; fertilizers; paper (sizing); cosmetic lotions.
Railroad shipping regulations: None.*

Magnesium Sulfite $MgSO_3.6H_2O$.
Color and properties: White, crystalline powder.
Constants: M.p.: Loses $6H_2O$ at 200°C.; b.p.: Decomposes.
Slightly soluble in water; insoluble in alcohol.
Derivation: By the action of sulfurous acid on magnesium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Magnesium-Tetrahydrogen Phosphate. See Magnesium biphosphate.

Magnesium Tungstate (Magnesium wolframate) $MgWoO_4$.
Color and properties: White crystals.
Soluble in acids; insoluble in water and alcohol.
Derivation: By the interaction of solutions of magnesium sulfate and ammonium tungstate.
Grades: Technical.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Wooden kegs.

Uses: Fluorescent screens for Roentgen rays; luminescent paint.

Railroad shipping regulations: None.*

Magnesium Wolframate. See Magnesium tungstate.

Magnetic Pyrites. See Pyrrhotite.

Magnetite (Loadstone; Magnetic iron ore) Fe_3O_4 often with Ti, Mg.

Black mineral, black streak, submetallic, or dull, to metallic luster. Contains 72.4% Fe. Readily recognized by strong attraction by magnet. Soluble in powder in hydrochloric acid.

Constants: Sp.gr. 4.9 to 5.2; hardness 5.5 to 6.5.

Occurrence: United States (New York, New Jersey, Pennsylvania, Arkansas, California, Washington, Utah), Cuba, Norway, Sweden, Germany, Siberia, Italy, Austria, Switzerland, Japan.

Uses: Important ore of iron.

Maize. See Indian corn.

Maize Oil. See Corn oil.

Malabar Kino. See Kino.

Malacca Nut. See Semecarpus.

Malachite (Green carbonate of copper; Mountain green) $Cu_2(OH)_2CO_3$, $CuCO_3.Cu(OH)_2$ or $2CuO.CO_2H_2O$.

Native hydrated basic copper carbonate. Bright-emerald to grass-green color, sometimes nearly black. Pale green streak, silky adamantine or dull luster.

Contents: 71.9% CuO, 19.9% CO_2 balance water. Found with other copper ores often as an alteration product.

Soluble in acids.

Sp.gr. 3.9 to 4.03; hardness 3.5 to 4.

Occurrence: United States (New Jersey, Pennsylvania, Wisconsin, Arizona, New Mexico, Utah, Nevada), Russia, France, England, Germany, Cuba, Chile, Australia, South Africa, West Africa.

Uses: Source of copper; ornamental stoneware (table tops, vases, etc.); pigment (limited, malachite green usually refers to the organic dye).

Malachite, Artificial. See Copper carbonate.

Malachite Green (Benzaldehyde green).

A triphenylmethane dye, being the zinc double chloride, oxalate, or ferric double chloride of tetramethyl-para-aminotriphenylcarbinol. The term is also sometimes applied to the mineral malachite.

Uses: Dyeing.

Malakin. See Salicyl-para-phenetidine.

Malarin (Acetophenone-para-phenetidine) $C_6H_5C(CH_3).NC_6H_4OC_2H_5$.

Constants: M.p. 88° C.

Uses: Medicine (antipyretic, antirheumatic, antineuralgic).

Maldonite. See Electrum.

Male Fern. See Aspidium.

Male Fern Oil.

Color and properties: Colorless to pale yellow liquid.

Chief known constituents: Hexyl and octyl esters of fatty acids.

Constants: Sp.gr. 0.850; b.p. 140° to 250°C.

Soluble in alcohol and ether.

Derivation: Distilled from the rhizome of Dryopteris filix-mas marginalis.

Method of purification: Rectification.

Grades: Technical; U.S.P.

Containers: Copper flasks; glass bottles.

Use: Medicine (vermifuge); preparation of liquors (gin).

Railroad shipping regulations: None.*

Male Fern Resinoid.

Greenish-brown semi-liquid, characteristic heavy odor

Chief constituent: Filmarone.

Soluble in alcohol.

Derivation: Extraction from male fern.

Uses: Perfumery (fixative).

Maleic Acid (Maleinic acid) $COOH(CH)_2COOH$.

Color and properties: Colorless crystals, possessing a grating, nauseous acid taste.

Constants: Sp.gr. 1.590; m.p. 136° to 137°C.; b.p. 160°C.

Soluble in water, alcohol and ether.

Derivation: (a) From malic acid by distillation. (b) Prepared by heating the acetyl derivative of malic acid. (c) By the catalytic oxidation of benzene.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles; tins.

Uses: Organic synthesis (malic, succinic, aspartic, tartaric, propionic, lactic, malonic, acrylic, hydracrylic acids); in the textile industry as such or in the form of various salts in the dyeing and finishing of cotton, wool and silk.

Railroad shipping regulations: None.*

Maleinic Acid. See Maleic acid.

Malic Acid (Oxysuccinic acid; Apple acid) $COOHCH_2CH(OH)COOH$.

Color and properties: Colorless crystals; agreeable, sour taste.

Constants: Sp.gr. 1.601; m.p. 100°C.

Soluble in water; slightly soluble in ether and alcohol.

Derivation: (a) From unripe fruit of mountain ash. (b) By the reduction of tartaric acid with hydriodic acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: 5, 25, 50, 100 lb. packages; 250 lb. barrels.

Uses: Medicine; manufacture of various chemical esters and salts.

Railroad shipping regulations: None.*

Mallebrein Prophylacticum. A 25% solution of aluminum chlorate stated to be a detoxicant of bacterial toxins and used in medicine in the treatment of some infectious diseases, such as diphtheria, laryngeal tuberculosis. Unofficial.

Railroad shipping regulations: None.*

Mallow Leaves (Malvaefolia; Pancake plant; Dutch cheese).

Dried leaves of Malva sylvestris and rotundifolia.

Habitat: Europe and western Asia.

Grades: N.F.

Containers: Bales.

Uses: Medicine (source of mucilaginous liquid).

Mallow, Marsh. See Althea.

Malon Oil. See Black-fish oil.

Malonic Acid (Methanedicarbonic acid) $CH_2(COOH)_2$.

Color and properties: White crystals.

Constants: M.p. 132° to 134°C.; b.p.: Decomposes.

Soluble in water, alcohol and ether.

Derivation: From monochloroacetic acid by action with potassium cyanide, followed by hydrolysis.

Method of purification: Crystallization.

Grades: Technical.

Containers: Tins.

Uses: Manufacture of veronal, dial, propanal and luminal.

Railroad shipping regulations: None.*

Malonic Ester. See Ethyl malonate.

Malonic Ester, Ethyl. See Ethylethyl malonate.

Malonurea. See Veronal.

Malt. Yellowish or amber-colored grains of barley which have been partially germinated by artificial means. It contains amylolytic enzymes and has an agreeable, characteristic odor and sweet taste. Black malt is grain which has been scorched in the drying process.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Amber: Brewing; medicine (extract of malt). Black: Coloring.

Railroad shipping regulations: None.*

Malt, Extract of. See Extract of malt.

Malt Sugar. See Maltose.

Maltase (Glucase). Occurs in yest, also to a slight extent in malt. Has never been obtained in concentrated form.

Preparation: Yeast is liquefied with ethyl acetate and exactly neutralized with ammonia. The presence of the enzyme can then be established.

Railroad shipping regulations: None.*

Maltha (Pissasphalt). Natural, dark, viscous bitumen. Soluble in benzene, carbon bisulfide, etc.; insoluble in water.

Malthenes. See Petrolenes.

Maltine. Extract of malt (q.v.).

Maltine, French. Diastase (q.v.).

Maltobiose. Maltose (q.v.).

Maltose.

Color and properties: Malt sugar crystallizing: (a) From water according to the formula $C_{12}H_{22}O_{11}.H_2O$. Loses the water at 100°C. in a current of dry air. (b) From alcohol according to the formula $C_{12}H_{22}O_{11}$.

Solubility: (a) Soluble in water, ethyl alcohol, methyl alcohol. (b) Soluble in water, slightly soluble in ethyl alcohol, more so in methyl alcohol.

Derivation: By the action of diastase (usually malt extract) upon starch paste.

Railroad shipping regulations: None.*

Maltum, U.S.P. Malt (q.v.) is not used directly in medicine but is official as the basis of extract of malt (q.v.).

Railroad shipping regulations: None.*

Malvae Folia. See Mallow leaves.

Manaca (Vegetable mercury; Franciscea; Camganiba; Mercurio-vegetal; Geratacaca; Brunfelsia). Root of Brunfelsia hopeana (Franciscea uniflora).

Habitat: Brazil, West Indies.

Grades: Technical; N.F.

Containers: Bales.

Uses: Medicine (treatment of rheumatism).

Railroad shipping regulations: None.

Mandarin Oil (Tangerine oil).

Color and properties: Essential oil; golden yellow (from mature fruit); olive green (from immature fruit). Characteristic refreshing odor.

Chief known constituents: Limonene; methylesters of anthranilic and methylanthranilic acids.

Constants: Sp.gr. 0.854 to 0.859 at 15°C.; optical rotation $+65°$ to $+75°$; refractive index 1.475 to 1.478; acid value up to 1.7; ester value 5 to 11; after acetylation 12.5.

Solubility in alcohol: In 7 to 10 vols. of 90% alcohol (with some turbidity).

Derivation: Expressed from the fresh peel of the mandarin orange, Citrus nobilis, L.

Uses: Flavoring; medicine.

Railroad shipping regulations: None.*

Mandarin Oil, Terpeneless.

Concentration: About 60 to 70 times that of the ordinary mandarin oil.

Solubility in alcohol: 1.5 to 3 vols. per 100 vols. of 70% alcohol; in about equal proportions with 80% alcohol.

Railroad shipping regulations: None.*

Mandelic Acid, Para-. See Amygdalic acid.

Mandelin's Reagent. 1 gram of ammonium vanadate dissolved in 200 cc. of concentrated sulfuric acid.

Mandelyl-para-phenetidine. See Amygdophenin.

Mandrake. See Podophyllum.

Manganapatite. See Apatite.

Manganblend. See Alabandite.

Manganbrucite. See Brucite.

Mangandalusite. A variety of andalusite (q.v.) containing manganese.

Manganese Mn. A reddish-gray or silvery, brittle metallic element.

Constants: Sp.gr. 7.42; m.p. 1,225°C.; b.p. 1,900°C.

Decomposes water.

Occurrence: Never found native. Important manganese ores are pyrolusite, braunite, manganite, psilomelane, rhodochrosite, rhodonite, wad. Manganiferous iron, silver and zinc ores are also important (franklinite, psilomelane). Principal sources of ores: United States, Russia, India, Brazil, West Africa.

Derivation: By reduction of the oxide with aluminum or carbon.

Grades: Technical.

Containers: Boxes.

Uses: Manufacture of steel (deoxidizer); iron copper, aluminum alloys.

Railroad shipping regulations: None.*

Manganese Acetate $Mn(C_2H_3O_2)_2.4H_2O$.

Color and properties: Pale red crystals.

Constants: Sp.gr. 1.6.

Soluble in water and alcohol.

Derivation: By the action of acetic acid on manganese hydroxide.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden kegs.

Uses: Textile dyeing; manufacturing bistre; catalyst in various chemical processes involving oxidation; leather tanning and finishing; paint and varnish (drier, boiled oil manufacture); fertilizers.

Railroad shipping regulations: None.*

Manganese, Battery. See Manganese dioxide.

Manganese Binoxide. See Manganese dioxide.

Manganese, Bog. See Wad.

Manganese Borate MnB_4O_7.

Color and properties: White powder.

Soluble in water.

Derivation: By the action of boric acid on manganese hydroxide.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden kegs.

Uses: Varnish and oil drier.

Railroad shipping regulations: None.*

Manganese-boron. An alloy of manganese and boron used in the making of brass, bronze and other alloys.

Manganese Carbonate $MnCO_3$.

Color and properties: Rose-colored crystals.

Constants: Sp.gr. 3.125 to 3.66; m.p.: Decomposes.

Soluble in dilute acids; insoluble in water.

Derivation: A precipitate from the addition of sodium carbonate to a solution of a manganese salt followed by filtration, washing and drying.

Grades: Technical; C.P.

Containers: Tins; glass bottles.

Uses: Manufacture of manganese salts; medicine; paint pigment; fertilizers.

Railroad shipping regulations: None.*

Manganese Chloride (a) $MnCl_2$; (b) $MnCl_2.4H_2O$.

Color and properties: Rose-colored crystals.

Constants: Sp.gr. (a) 2.478; (b) 1.913; m.p. (a) 650°C.; (b) 87.5°C.; b.p. (b) 106°C.

Soluble in water, slightly soluble in alcohol; insoluble in ether.

Derivation: By the action of hydrochloric acid on manganese dioxide, with subsequent crystallization.

Method of purification: Recrystallization.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 600, 700 lb. casks.
Uses: Catalyst in the chlorination of organic compounds; paints (drier, manufacture of a brown pigment by reaction with a solution of bichromates); dyeing; pharmaceutical preparations; stimulant in fertilizer compositions.
Railroad shipping regulations: None.*

Manganese Citrate (Manganous citrate) $Mn_3(C_6H_5O_7)_2$.
Color and properties: White powder.
Soluble in water in presence of sodium citrate.
Derivation: By the action of citric acid on manganese hydroxide.
Method of purification: Crystallization.
Grades: Technical; N.F.
Containers: Glass bottles.
Uses: Medicine (for its citrate content).
Railroad shipping regulations: None.*

Manganese-copper. An alloy of manganese and copper used for electric resistances and the staybolts of locomotive fire-boxes.

Manganese Dioxide (Manganese binoxide; Battery manganese; Manganese peroxide; Glass makers' soap) MnO_2.
Color and properties: Black crystals or amorphous powder.
Constants: Sp.gr. 5.026; m.p.: Decomposes.
Soluble in hydrochloric acid; insoluble in water.
Derivation: (a) Found as such in nature. See Pyrolusite. (b) By heating manganese oxide in a furnace in presence of oxygen.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25, 50, 100 lb. boxes; 100 lb. kegs; 750, 1,000 lb. barrels.
Uses: Oxidizing agent; chemicals (manganese compounds, various chemical processes); dyes (oxidation of leuco compounds, manufacture of purpurin from alizarin); intermediates (oxidizing agent, manufacture of benzoic acid and benzaldehyde from toluene, manufacture of hydroquinone); medicine; ceramic glazes and enamels; pyrotechnics; matches; match-box friction surfaces; special alloy steels; manganiferous cast and wrought irons; enameled iron ware (dark violet, black and metallic shades); deferrizing water; increasing tackiness of rubber; glass (coloring, neutralizing iron stains); dry batteries; electrodes (electrolysis of zinc sulfate, copper sulfate, etc.); textiles (production of brown shades, dyeing cotton khaki colors, printing); fertilizers; paints (starting point of linoleate and resinate driers, manufacture of various drying oils, pigment, as a water color when made into paste form with gums).
Railroad shipping regulations: None.*

Manganese Dioxide, Black. See Pyrolusite.

Manganese Fluoride. See Manganous fluoride.

Manganese Glycerinophosphate. See Manganese glycerophosphate.

Manganese Glycerophosphate (Manganese glycerinophosphate) $MnC_3H_7O_3.PO_3$.
Color and properties: Yellowish-white or pinkish powder.
Soluble in water in presence of citric acid.
Derivation: By the action of glycerophosphoric acid on manganese hydroxide.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Medicine (for its glycerophosphate content).
Railroad shipping regulations: None.*

Manganese Green. See Barium manganate.

Manganese Hydrate. See Manganic hydroxide.

Manganese Hydroxide. See Manganic hydroxide.

Manganese Hypophosphite $Mn(H_2PO_2)_2.H_2O$.
Color and properties: Pink crystals or powder.
Soluble in water; insoluble in alcohol.
Derivation: Interaction of manganese sulfate and calcium hypophosphite.
Method of purification: Crystallization.
Grades: Technical; N.F.
Containers: 1 lb. bottles; 5, 10, 25 lb. cans; 100 lb. kegs.
Uses: Medicine (of doubtful value).
Railroad shipping regulations: None.*

Manganese Iodide. See Manganous iodide.

Manganese Lactate $Mn(C_3H_5O_3)_2.3H_2O$.
Color and properties: Pale red crystals.
Soluble in water and alcohol.
Derivation: By the action of lactic acid on manganese hydroxide.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Manganese-Lead Resinate.
Derivation: A mixture of lead and manganese resinates.
Grades: Technical.
Containers: Wooden kegs.
Uses: Varnish and oil drier.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Manganese Linoleate $Mn\ (C_{18}H_{31}O_2)_2$.
Color and properties: Dark brown, plaster-like mass.
Soluble in linseed oil.
Derivation: By boiling a manganese salt, sodium linoleate and water.
Grades: Technical.
Containers: Wooden kegs.
Uses: Paint and varnish drier; pharmaceutical preparations.
Railroad shipping regulations. None.*

Manganese Monoxide. See Manganous oxide.

Manganese Oleate $Mn(C_{18}H_{33}O_2)_2$.
Color and properties: Brown, granular mass.
Soluble in oleic acid; insoluble in water.
Derivation: By boiling manganese chloride, sodium oleate and water.
Grades: Technical.
Containers: Wooden kegs.
Uses: Medicine; varnish drier.
Railroad shipping regulations. None.*

Manganese Oxalate $MnC_2O_4.2\frac{1}{2}H_2O$.
Color and properties: White crystalline powder.
Constants: Sp.gr. 2.453; m.p.: Decomposes at 150°C.
Soluble in dilute acids; very slightly soluble in water.
Derivation: By adding sodium oxalate to manganese chloride.
Grades: Technical.
Containers: Wooden barrels.
Uses: Metallic manganese; paint and varnish drier.
Railroad shipping regulations: None.*

Manganese Oxide. See Manganous oxide.

Manganese Peptonate.
Color and properties: Brown powder.
Soluble in water.
Uses: Medicine (treatment of anemias, unofficial).
Railroad shipping regulations: None.*

Manganese Peroxide. See Manganese dioxide.

Manganese Peroxide, Colloidal Hydrated. See Oxynitrozanibeletti.

Manganese Phosphate. See Manganous ortho-phosphate.

Manganese Protoxide. See Manganous oxide.

Manganese Resinate $Mn(C_{20}H_{29}O_2)_2$.
Color and properties: Dark, brownish-black mass.
Soluble in hot linseed oil; insoluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By boiling manganese hydroxide, resin oil and water.
Grades: Technical.
Containers: Wooden kegs.
Uses: Varnish and oil drier.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Manganese Silicate. See Manganous silicate.

Manganese Steel. See Iron and steel (Ferrum).

Manganese Sulfate. See Manganous sulfate.

Manganese-titanium. An alloy of manganese and titanium.

Manganic Hydroxide (Manganese hydroxide; Manganese hydrate) $Mn(OH)_2$.
Color and properties: A brown powder, occurring in nature as psilomelane.
Constants: Sp.gr. 3.258; m.p.: Decomposes.
Soluble in acids; insoluble in water.
Derivation: By adding a solution of sodium hydroxide to a solution of a manganese salt, filtering, washing and drying.
Grades: Technical.
Containers: Wooden barrels.
Uses: Pigment for fabrics; ceramics.
Railroad shipping regulations: None.*

Manganin. An alloy of copper and manganese with small amounts of nickel and iron, of high resistance and exceedingly low temperature coefficient.

Manganite (Gray manganese ore) $MnO(OH)$ or $Mn_2O_3.H_2O$.
Steel-gray to iron-black mineral, reddish-brown to black streak, submetallic luster. Contains 62.4% manganese, 27.3% oxygen, 10.3% H_2O. Formed in the same deposits as pyrolusite (q.v.), which is frequently an alteration product of manganite.
Constants: Sp.gr. 4.2 to 4.4; hardness 4.
Occurrence: United States (Michigan, Colorado), Germany, Sweden, England, Canada.
Uses: An important ore of manganese.

Manganous Citrate. See Manganese citrate.

Manganous Fluoride (Manganese fluoride) MnF_2.
Color and properties: Reddish powder.
Constants: Sp.gr. 3.98; m.p. 856°C.
Soluble in acids; insoluble in water, alcohol and ether.
Derivation: By the action of hydrofluoric acid on manganous hydroxide.
Grades: Technical.
Containers: Wooden kegs.
Uses: Ceramics.
Railroad shipping regulations: None.*

Manganous Iodide (Manganese iodide) MnI_2.
Color and properties: Yellowish-brown, deliquescent, crystalline mass.
Constants: M.p.: Decomposes.
Soluble in water with decomposition.
Derivation: By the action of hydriodic acid on manganous hydroxide.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Manganous Ortho-phosphate (Manganese phosphate) $Mn_3(PO_4)_2.7H_2O$.
Color and properties: Reddish-white powder.
Soluble in mineral acids; insoluble in water.
Derivation: By the action of ortho-phosphoric acid on manganous hydroxide.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Medicine; chemical reagent.
Railroad shipping regulations: None.*

Manganous Oxide (Manganese protoxide; Manganese oxide) MnO.
Color and properties: Grass-green powder.
Constants: Sp.gr. 5.09 to 5.18; m.p.: Is converted into Mn_3O_4.
Soluble in acids; insoluble in water.
Derivation: (a) By reduction of the dioxide in hydrogen. (b) By heating the carbonate with exclusion of air.
Grades: Technical.
Containers: Wooden barrels; iron drums.
Uses: Medicine; textile printing; analytical chemistry; catalyst in manufacture of allyl alcohol; ceramics; dry batteries; paints; colored glass; bleaching tallow.
Railroad shipping regulations: None.*

Manganous Silicate (Manganese silicate) $MnSiO_3$.
Color and properties: Red crystals or yellowish-red powder.
Constants: Sp.gr. 3.35; m.p. 1,218°C.
Insoluble in water.
Derivation: By the interaction of manganese oxide and hydrosilicic acid.
Grades: Technical.
Containers: Wooden kegs.
Uses: Ceramics; coloring glass.
Railroad shipping regulations: None.*

Manganous Sulfate (Manganese sulfate) $MnSO_4.4H_2O$.
Color and properties: Translucent, pale rose-red, efflorescent prisms.
Constants: Sp.gr. 2.107; b.p. 30°C.; m.p. 700°C.; decomposes at 850°C.
Soluble in water; insoluble in alcohol.
Derivation: By the action of sulfuric acid on manganese oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.; N.F.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 375 lb. barrels; 600 lb. casks.
Uses: Manganese compounds; chrome brown manufacture; oxidizing agent; medicine; textile dyeing and calico printing; ceramics; fertilizers for vines and tobacco plants; paper manufacture; paints and varnishes (manufacture of oxalate and borate driers, ingredient of drying compositions, varnishes and boiled linseed oil manufacture, drier for pale oils).
Railroad shipping regulations: None.*

Mangle. See Semecarpus.

Mango Gum.
Color and properties: Amber or reddish-yellow lumps; almost transparent.
Soluble in water (39%).
Derivation: From the mango tree; Mangifera indica, L., native to India.
Railroad shipping regulations: None.*

Mangrove.
Derivation: From Rhizophora mangle.
Habitat: West Africa and Borneo.
Grades: Mangrove cutch: 55% tannin; liquid: 25% tannin.
Containers: Wooden barrels.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Manhattan Spirits. A purified methyl alcohol (q.v.) similar to Columbian spirits (q.v.).

Manila Gum Copal.
Color and properties: Generally pebble-like pieces of a pale brownish color.
Constants: Sp.gr. 1.062; m.p. 230° to 250°C.
Soluble in ether, methyl alcohol and ethyl alcohol; partially soluble in amyl alcohol; insoluble in water.
Derivation: A copal resin imported from the Philippine Islands.
Grades: Technical.
Containers: Bags.
Uses: Spirit varnishes; enamel paints.
Railroad shipping regulations: None.*

Manjak. See Glance pitch.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Manna.
Concrete saccharin exudation of Fraxinus ornus (Manna ash). Small round lumps, yellow or grayish.
Habitat: Mediterranean basin, Spain to Asia Minor.
Grades: Flake, manna in sorts.
Containers: Bags.
Uses: Medicine (gentle laxative).
Railroad shipping regulations: None.*

Manna Sugar. See Mannitol.

Mannite. See Mannitol.

Mannitol (Manna sugar; Mannite) $C_6H_8(OH)_6$.
Color and properties: White crystalline prisms.
Constants: Sp.gr. 1.521; m.p. 165° to 166°C.; b.p. 290° to 295°C.
Soluble in water; slightly soluble in alcohol; insoluble in ether.
Derivation: By extraction from manna, Fraxinus ornus.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Manure Salts. Potash salts containing high percentage of chloride and from 20 to 30% of potash (K_2O).
Used in fertilizer.
Railroad shipping regulations: None.*
See Potash-magnesia double salt.

Maranta. See Starch.

Marany Nut. See Semecarpus.

Marble. A coarse to fine granular or crystalline limestone generally susceptible of a high polish. Marbles vary considerably in composition, structure and appearance and are known under such names as: Parian, Lychnitis, Pentelic, Carrara (luna), giallo antico, rosso antico, porfido rosso antico, verde antico, Bardiglio, Cipollino, Plymouth, Madrepore, encrinital, rosewood, black, petit granite, lumachella, landscape, ruin, ammonite, forest, purbeck, Sussex, Algerian onyx, Mexican onyx, ophicalcite, Irish green. The term "marble" is rather loosely applied commercially and is sometimes used for ornamental stones which are not limestones.

Marcasite (White iron pyrites) FeS_2, as in pyrite.
Pale brass-yellow mineral deepening in color after exposure. Metallic luster, streak nearly black. Resembles pyrite but can be distinguished from it by crystalline form, by chemical tests and by whiter color on fresh fracture. Contains 46.6% iron, 53.4% sulfur, sometimes with small amount of arsenic.
Constants: Sp.gr. 4.6 to 4.9; hardness 6 to 6.5.
Occurrence: United States (Illinois, Wisconsin, Missouri), Bohemia, Germany, England.
Uses: Ore of iron; sulfuric acid manufacture.

Marchies. See Margine.

Marcs. The stems and skins of grapes obtained as a residue from wine factories. Used in manufacture of verdigris.

Margarine. See Oleomargarine.

Margarine Oils. Edible oils, used in the manufacture of oleomargarine, and containing not over 0.1% free fatty acid.

Margarite (Calcium mica) $H_2CaAl_4Si_2O_{12}$.
One of a group of silicate minerals known as "brittle micas" (q.v.), which may be classed as transition products from the micas to the chlorite minerals. Color, gray, yellow, pink, reddish-white, pearly or vitreous luster.
Constants: Sp.gr. 2.99 to 3.08; hardness 3.5 to 4.5.
Occurrence: United States (Massachusetts, Pennsylvania, North Carolina, Georgia, Alabama), Asia Minor, Austria.

Margine (Marchies). A term sometimes applied to the cake and meal obtained as a residue in the manufacture of olive oil. Used as manure and an insecticide. See also Sanse.

Marialite. See Wernerite.

Marignac's Salt. Potassium stannosulfate.

Marigold. See Calendula.

Marjoram (Sweet marjoram; Knotted marjoram).
The entire herb, Origanum marjoram.
Habitat: Southern Europe and western Asia; widely cultivated.
Grades: Technical.
Containers: Bales.
Uses: Medicine.
Railroad shipping regulations: None.*

Marjoram Oil (Calamintha Oil).
Color and properties: Colorless, yellowish or greenish-yellow liquid; strong, penetrating odor.
Chief known constituents: Terpineol; terpenes.
Constants: Sp.gr. 0.890 to 0.910; optical rotation +5° to +18°.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from marjoram.
Method of purification: Rectification.
Grades: Technical.
Containers: Copper flasks; glass bottles.
Uses: Medicine; perfuming soaps; toilet preparations.
Railroad shipping regulations: None.*

Marking Nut. See Semecarpus.

Marl. A soft, earthy deposit of calcium carbonate, containing more or less clay and sand, used in manufacture of cement. Alabama, Arkansas, Canada, Delaware, Florida, Georgia, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Minnesota, New Hampshire, New Jersey, New York, North Carolina, Ohio, Tennessee, South Carolina, Vermont, Virginia and Wyoming.

Marlstone. An argillaceous ferruginous limestone.

Marme's Reagent. A reagent used for testing for alkaloids. It is made by dissolving 20 parts of potassium iodide and 10 parts of cadmium iodide in 80 parts of water.

Marmolite. See Serpentine.

Marmorosch Diamonds. See Rock crystal.

Marquis' Reagent.
A reagent used for testing for alkaloids. It consists of a solution of formalin in sulfuric acid.

Marrubium (Horehound; Hoarhound).
Derivation: Dried leaves and tops of Marrubium vulgare.
Habitat: Europe, central Asia and United States.
Grades: Technical; U.S.P.
Containers: Boxes; bags.
Uses: Medicine; confectionery.
Railroad shipping regulations: None.*

Mars Brown. See Mars pigments.

Mars Orange. See Mars pigments.

Mars Pigments. Five pigments obtained by adding milk of lime to a solution of ferrous sulfate and calcining the precipitate formed. The different shades are obtained according to the temperature at which the calcination is conducted. These pigments are termed respectively Mars yellow, Mars orange, Mars brown, Mars red and Mars violet. The Mars pigments are characterized by fine hues and great permanence.

Mars Red. See Mars pigments.

Mars Violet. See Mars pigments.

Mars Yellow. See Mars pigments.

Marseillene. Soap soluble in gasoline.

Marseilles Soap. See Soap.

Marsh Gas. See Methane.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Marshmallow. See Althea.

Martensite. The chief constituent of hardened carbon tool steels. It is a solution of C or Fe_3C in beta-iron, or an exceedingly fine-grained alpha-iron with C or Fe_3C in atomic or molecular dispersion. Carbon content up to 1%. Easily obtained by quenching small bodies of hypereutectoid steel in cold water. More difficult to obtain in low-carbon steels.

Martin's Cement. See under Cements, structural.

Mary-bud. See Calendula.

Maryland Pink. See Spigelia.

Marzipan. A mixture of cane sugar and crushed almonds used in confectionery.

Mascagnite $(NH_4)_2SO_4$.
A natural ammonium sulfate found as mealy incrustations on lava or in guano or near burning coal beds. Color, lemon-yellow, yellowish or gray; white streak; dull or vitreous luster.
Constants: Sp.gr. 1.77; hardness 2 to 2.5.

Masonite. A process for making composition board by exploding wood chips under a steam pressure of 1,000 lbs. per sq. in. The fiber is waterproofed with an emulsion having a paraffin base and pressed into boards of the desired thickness. Also applied to Micas, brittle (q.v.).

Massecuite. A term applied in the sugar industry to the mixture of sugar and molasses prior to the removal of the molasses.

Massicot. (a) Natural lead monoxide, PbO. Contains 92.8% lead.
Occurrence: United States (Colorado, Idaho, Nevada and Virginia).
(b) This term was formerly used in metallurgy to designate an oxide of lead corresponding to the same formula as litharge (PbO) but having a different physical state. It is formed by the oxidation of a bath of metallic lead at a temperature of about 345°C. so that the oxide formed is not melted. When melted it is converted into litharge. The tendency at the present time is to drop the use of the term "Massicot" and to use "Litharge" for all varieties of lead monoxide.

Masterwort. See Imperatoria.

Mastic Gum (Pistachia galls; Mastiche; Mastix).
Concrete resinous exudations of the tree Pistacia lentiscus.
About 90% soluble in alcohol, 97% soluble in ether.
Habitat: Mediterranean islands.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (ingredient of cathartic pills); condiment; tooth cements; chewing-gum; adhesive; lacquers; medical plasters; incense.
Railroad shipping regulations: None.*

Mastic Oil.
Color and properties: Colorless essential oil; characteristic, strongly balsamic odor.
Chief known constituent: Pinenes.
Constants: Sp.gr. 0.857 to 0.903 at 15°C.; optical rotation + 22° to + 34°; refractive index 1,468 to 1.476; acid value up to 5; ester value 2.5 to 19, after acetylation 17 to 21.
Solubility in alcohol: In 4 to 10 vols. of 90% alcohol; in 0.2 to 2 vols. of 95% alcohol.
Derivation: By distillation of mastic.
Uses: Medicine.
Railroad shipping regulations: None.*

Mastiche. See Mastic gum.

Mastix. See Mastic gum.

Mata-Perro. See Condurango.

Matte. An impure, semi-metallic furnace product containing metallic sulfides; obtained during one of the operations in smelting of sulfide ores, especially those of copper and nickel.

Matico.
Dried leaves of Piper angustifolium.
Habitat: Peru, Bolivia, Brazil, Mexico and Cuba.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (stimulative astringent).
Railroad shipping regulations: None.*

Matico Oil.
Color and properties: Yellowish-brown, liquid oil; peculiar odor.
Chief known constituents: Asarone; methyl eugenol.
Constants: Sp.gr.: Leaf: 0.93; Flower: 1.13; optical rotation +5.5° to −0.25°.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the leaves of flowers of Piper angustifolium.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; copper flasks.
Uses: Medicine.
Railroad shipping regulations: None.*

Matricaria (German chamomile; Wild chamomile).
Derivation: Dried flower-heads of Matricaria chamomilla.
Habitat: Europe and western Asia; cultivated in the United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (mild tonic similar to chamomile).
Railroad shipping regulations: None.*

Maw Seeds. Black poppy seeds.

May Apple. See Podophyllum.

May Blossom. See Convallaria.

May Lily. See Convallaria.

May-Pop. See Passion flower.

Mayer's Reagent. See Mercuric potassium iodide.

Mazola. A proprietary name for corn oil (q.v.).

McAbees.
United States permissible explosives classified by the United States Bureau of Mines as follows: (See Explosives, permissible, for explanation of classes.)

Variety No.	Volume of Poisonous Gases Class	Characteristic Ingredient Class
Y	B	Ia
Z	A	Ia

Railroad shipping regulations: High explosive.

Meadow Anemone. See Pulsatilla.

Meadow Crocus. See Colchicum.

Meadow Green. See Copper acetoarsenite.

Meadow Saffron. See Colchicum.

Meat Flour. See Meat meal.

Meat Meal. A mixture of meat scrap and bones (from which the grease has been removed) ground to a mealy form. In other words, ground abattoir by-product plant tankage (q.v.). Used as fertilizer.
Railroad shipping regulations: None.*

Mecca Balsam. See Balm of Gilead.

Mecca Galls. See Galls.

Meconic Acid $OHC_5HO_2(COOH)_2.3H_2O$.
Color and properties: White crystals.
Soluble in water and in alcohol.
Derivation: From opium.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Meconin (Opianyl) $C_{10}H_{10}O_4$.
White crystals, soluble in hot water, alcohol, chloroform, essential oils. A neutral principle of opium, occurring also in hydrastis; may be

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

synthesized from guaiacol or by the oxidation of narcotine.
Railroad shipping regulations: None.*

Medina Cement. See under Cements, structural.

Meehanite Metal. A ferrous alloy containing in addition to iron, 2 to 3% carbon, 1 to 24% silicon, 0.1% phosphorus, 0.04 to 0.14% sulfur.

Meerschaum (Sepiolite) $H_4Mg_2Si_3O_{10}$, with partial replacement of Mg by Cu and Ni.
A tough, compact, natural hydrous magnesium silicate. Color, white, grayish-white sometimes tinted yellow or reddish.
Constants: Sp.gr. 2.0; hardness 2 to 2.5.
Occurrence: Turkey, Spain, Greece, Morocco, Moravia.
Uses: Tobacco pipes. Also used as a soap in Algeria and as a building stone in Spain.

Megass. See Bagasse.

Megilp. A linseed oil-mastic varnish mixture. Used as an ingredient of artist's oil paints.

Meionite. See Wernerite.

Mel, U.S.P. Honey.

Mel Acetatum. See Oxymel.

Mel Depuratum, U.S.P. Clarified honey.

Mel Rosae, U.S.P. Honey of rose.

Melaconite. See Tenorite.

Melampyrit. See Dulcite.

Melegueta Pepper Oil. See Grains of paradise oil.

Meletim. See Quercetin.

Melilite. A complex calcium-aluminum silicate of uncertain formula. Na, Mg, and Fe may be present or may replace the Ca and Al. Color, white, yellow, gray, brown; vitreous to resinous luster. Found in volcanic rocks rich in alkalis and poor in silica, in cement clinker and in blast-furnace slag.
Constants: Sp.gr. 2.90 to 3.10; hardness 5.
Occurrence: United States (Colorado), Italy, Sandwich Isles, Germany.

Melilotus (Yellow sweet clover).
Dried leaf and flowering top of Melilotus officinalis.
Habitat: Europe; cultivated in United States.
Grades: N.F.
Uses: Medicine (of doubtful value); flavoring Gruyère cheese.

Melissa Oil. See Balm oil.

Mellitose. See Raffinose.

Mellitriose. See Raffinose.

Melubrin (Sodium 1-phenyl-2:3-dimethyl-5-pyrazolone-4-aminomethane sulfonate) $C_{11}H_{11}N_2ONHCH_2SO_3Na$.
Color and properties: White crystalline powder, almost tasteless.
Soluble in water, sparingly soluble in alcohol.
Derivation: By the action of a solution of formaldehyde bisulfite on 1-phenyl-2:3-dimethyl-4-amino-pyrazolone.
Uses: Medicine (analgesic, antirheumatic, antipyretic, unofficial).
Railroad shipping regulations: None.*

Menaccanite. See Ilmenite.

Mengite. See Monazite.

Menhaden Oil (Pogy oil; Mossbunker oil).
Color and properties: A yellowish-brown or reddish-brown liquid; characteristic odor.
Constants: Sp.gr. 0.927 to 0.933; saponification value 190.6; iodine value 139 to 180; refractive index 1.480.
Soluble in ether, benzene, naphtha and carbon bisulfide.
Derivation: By cooking or pressing the body of the menhaden (mossbunker) fish. Winter oils are made by chilling which separates stearin.
Method of purification: Filtration and bleaching with fullers' earth.
Grades: Prime crude; brown strained; strained; bleached; winter oil; bleached winter white oil. Also sometimes graded:—A, extra pale; B, pale; C. brown; D, dark brown.
Containers: Wooden barrels; tank cars.
Uses: Leather dressing; substitute for linseed oil in making patent leather; chamois tanning; making fats by hydrogenation; soap making, after hydrogenation; tempering steel; adulterating cod-liver oil; printing and lithographic inks (linseed oil substitute in paints and linoleum).
Railroad shipping regulations: None.*

Menilite. See Opal.

Menosal. See Menthylsalicylicmethylester.

Mentha Aquatica. Watermint.

Mentha Crispa. See Crispmint.

Mentha Piperita, U.S.P. See Peppermint.

Mentha Pulegium. European pennyroyal.

Mentha Viridis, U.S.P. Spearmint.

Menthene $C_{10}H_{18}$ or $C_{10}H_{16}$.
Color and properties: Colorless, oily liquid.
Constants: B.p. 167°C.
Derivation: A dehydration product of menthol or the hydrogenation product of cymene.
Railroad shipping regulations: None.*

Menthol (Hexahydrothymol; Methylpropylphenylhexahydride; Methylhydroxyisopropylcyclohexane-para-mentheneol; Peppermint camphor) $C_{10}H_{19}OH$.
Color and properties: Colorless crystals; peppermint-like odor.
Constants: Sp.gr. 0.890; m.p. 44.5°C.; b.p. 215.5°C.
Soluble in alcohol, ether, chloroform, benzine, glacial acetic acid, liquid petrolatum and fixed or volatile oils; slightly soluble in water.
Derivation: By freezing from peppermint oil.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: Glass bottles; tins.
Uses: Medicine (local anesthetic, antiseptic or counter-irritant); perfumery; confectionery.
Railroad shipping regulations: None.*

Menthol Valerate. See Validol.

Menthone $C_{10}H_{18}O$.
Color and properties: Colorless, oily, mobile liquid.
Constants: Sp.gr. 0.897 (15°C.), b.p. 207°C.
Derivation: A ketone found in oil of peppermint.
Railroad shipping regulations: None.*

Menthorol
Color and properties: Moderately thick liquid. Pleasant taste, odor of para-chlorophenol.
Derivation: Said to be a mixture of para-chlorophenol and menthol.
Uses: Medicine (ulcerations of throat and lungs, unofficial).
Railroad shipping regulations: None.*

Menthyl Acetate $C_{10}H_{19}OCOOCH_3$.
An ester of menthol, b.p. 227° to 228°C., found in peppermint oil. Used as a flavor.
Railroad shipping regulations: None.*

Menthyl Ethylglycocolate (Colmenthol; Coryfin) $C_{10}H_{19}OCOCH_2OC_2H_5$.
Color and properties: Colorless liquid, odorless. Decomposed by alkalis with release of menthol. Less irritating to mucous membranes than menthol.
Soluble in alcohol, ether; slightly soluble in water.
Uses: Medicine (catarrh, laryngitis, bronchitis, unofficial).
Railroad shipping regulations: None.*

Menthyl Salicylate (Salimenthol; Samol) $C_6H_4(OH)COOC_{10}H_{19}$.
Color and properties: Colorless liquid, miscible

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

with alcohol, ether, chloroform and fatty oils in all proportions.
Insoluble in water.
Uses: Medicine (external, local anodyne in rheumatism and other painful conditions, unofficial).
Railroad shipping regulations: None.*

Menthylsalicylicmethylester (Methylmenthylsalicylate; Menosal) $C_{18}H_{26}O_3$.
Color and properties: Oily, transparent liquid, almost odorless and tasteless.
Constants: Sp.gr. 1.037 (approximate); b.p. 189°C. (17 mm.).
Soluble in alcohol, ether, chloroform, fatty oils.
Uses: Medicine (antirheumatic, unofficial).
Railroad shipping regulations: None.*

Menyanthin. See Inulin.

Mercerized Cotton. Cotton which has been passed through a cold bath of sodium hydroxide and afterwards washed with hot and cold water. The process causes a shrinking of the fiber with an increased attraction for coloring matter and imparts a luster to the fiber.

Mercer's Liquor. A solution containing potassium ferricyanide used for etching.

Merclor B.
Trade name for a solution of sodium hypochlorite (NaOCl).
Color and properties: Yellow liquid.
Derivation: From caustic soda and chlorine. The reaction is carried on under definite temperature control and the proportions of raw materials, after being freed from impurities, are so adjusted that the resultant product possesses unusual stability and low alkalinity. It is so made that its contact with materials to be bleached renders it very active in dilute solution at temperatures as low as 70°F.
Grades: 22°Bé., 12% available Cl by volume.
Containers: Carboys, rubber-lined drums, tank trucks.
Uses: Bleach (textile mills, power laundries, paper mills); oxidizing agent (developing vat and sulfur colors, chlorinating wool).

Merclor D.
Trade name for a solution of sodium hypochlorite (NaOCl). This being the disinfectant grade.
Color and properties: Yellow liquid.
Derivation. See Merclor B.
Grades: 12% available Cl by volume.
Containers: 1, 5, 13 gal. carboys.
Uses: Used as a general disinfectant and deodorant wherever bacteria occur. Its phenol coefficient, 146 to 220 (calculated in available chlorine), makes it the most powerful disinfectant known, corrosive sublimate alone excepted. It is especially applicable in dairies and creameries, ice cream plants, poultry farms, swimming pools, etc.

Mercoid. A colloidal suspension of calomel and mercury salicylsulfonate used in medicine as a source of mercury. Unofficial.
Railroad shipping regulations: None.*

Mercuranine. See 2:7-Dibromo-4-hydroxymercurifluorescein, disodium salt.

Mercurial Tetrahedrite. See Schwartzite.

Mercuric Acetate (Mercury acetate) $Hg(C_2H_3O_2)_2$.
Color and properties: White, crystalline powder; poisonous!
Constants: Sp.gr. 3.2544.
Soluble in alcohol and water.
Derivation: By the action of acetic acid on mercury.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: Class B poison.

Mercuric-ammonium Chloride (Ammoniated mercury chloride; White precipitate; Aminomercuric chloride; Ammoniated mercury; Mercury cosmetic; Hydrargyrum ammoniatum; Lemery's white precipitate) $HgNH_2Cl$.
Color and properties: White, pulverulent lumps or powder; earthy, metallic taste; poisonous!
Soluble in ammonium carbonate and sodium thiosulfate solutions and in warm acids; insoluble in water.
Derivation: By precipitating mercuric chloride with ammonium hydroxide in excess.
Grades: U.S.P.
Containers: 1, 5, 25, 50 lb. boxes; 100 lb. kegs; 200 lb. barrels.
Uses: Medicine (external application for parasitic skin diseases).
Railroad shipping regulations: Class B poison(?)*

Mercuric Benzoate (Mercury benzoate) $Hg(C_7H_5O_2)_2.H_2O$.
Color and properties: White crystals; poisonous!
Soluble in solutions of sodium chloride and ammonium benzoate; slightly soluble in alcohol.
Derivation: By the interaction of a mercuric salt and sodium benzoate.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Mercuric Biniodide. See Mercuric iodide.

Mercuric Bromide (Mercury bromide) $HgBr_2$
Color and properties: White, rhombic crystals; poisonous!
Constants: Sp.gr. 5.74; m.p. 235°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By adding potassium bromide to a solution of a mercuric salt and crystallizing.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: Class B poison(?)*

Mercuric Chloride (Corrosive sublimate; Mercury bichloride; Mercury chloride, corrosive; "Sublimate"; Mercury protochloride; Hydrargyri chloridum corrosivum; Hydrargyri perchloridum). $HgCl_2$.
Color and properties: White crystals or powder; very poisonous!
Constants: Sp.gr. 5.32; m.p. 265°C.; b.p. 303°C.
Soluble in water, alcohol, ether, pyridine and acetic acid ester.
Derivation: (1) Direct combination of chlorine with mercury heated to volatilizing point. (2) By subliming mercuric sulfate with common salt.
Method of purification: Recrystallization and sublimation.
Impurities: Mercurous chloride.
Grades: Technical; lump; crystals; granular; powder; C.P.; U.S.P.
Containers: Glass bottles; 25 lb. boxes; 200-250 lb. kegs.
Uses: Manufacture of calomel and other mercury compounds; organic synthesis (catalyst, particularly in brominating); analytical reagent; medicine (syphilis, rheumatism, antiseptic); metallurgy (metal coating, electroplating aluminum, manufacture of tin and zinc alloys of fine structure, bronzing steel); tanning; wood preservative; embalming fluids; textile printing; dry batteries; photography; process engraving and lithography; mordanting rabbit and beaver fur in hat making.
Railroad shipping regulations: Class B poison.

Mercuric Cyanide (Mercury cyanide) $Hg(CN)_2$.
Color and properties: Colorless, transparent prisms, darkened by light; poisonous!

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 4.018; m.p.: Decomposes.
Soluble in water and alcohol.
Derivation: By the interaction of mercuric oxide and an aqueous solution of hydrocyanic acid.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Amber glass bottles; wooden kegs.
Uses: Medicine; germicidal soaps; manufacturing cyanogen gas; photography.
Railroad shipping regulations: Class B poison.

Mercuric Dioxysulfate. See Mercuric subsulfate.

Mercuric Iodide (Mercuric biniodide; Mercury biniodide; Mercury protoiodide; Mercury iodide, red; Mercury iodide, yellow; Hydrargyri iodidum rubrum) HgI_2.
Color and properties: (a) Red, tetragonal crystals; turn yellow when heated to 150°C., returning to red on cooling; (b) Yellow, rhombic crystals; poisonous!

Constants:	(a)	(b)
Specific gravity	6.2 to 6.32	5.91 to 6.06
Melting-point	241°C. to 257°C.	241°C.
Boiling-point	349°C.	349°C.

Soluble in ether, sodium thiosulfate or potasium iodide solutions; insoluble in water. Yellow form soluble in alcohol.
Derivation: (a) By the direct union of mercury and iodine. (b) As a precipitate by adding potassium iodide to a solution of a mercuric salt. Yellow form precipitated from alcoholic solutions.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 10, 25 lb. jars; 100 lb. kegs.
Uses: Medicine (similar to mercuric chloride).
Railroad shipping regulations: Class B poison(?)*

Mercuric Lactate $Hg(C_3H_5O_3)_2$.
Color and properties: White crystalline powder.
Soluble in water.
Uses: Medicine (treatment of syphilitic lesions, unofficial).
Railroad shipping regulations: None(?)*

Mercuric Nitrate (Mercury nitrate; Mercury pernitrate) $Hg(NO_3)_2.2H_2O$.
Color and properties: Colorless crystals or white deliquescent powder; poisonous!
Soluble in water and nitric acid; insoluble in alcohol.
Derivation: By the action of hot nitric acid on mercury.
Method of purification: Crystallization.
Impurities: Mercurous nitrate.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 10, 25 lb. jars; 100 lb. kegs.
Uses: Nitration of aromatic organic compounds; medicine; felt manufacture.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Mercuric Oleate (Mercury oleate; Hydrargyrum oleatum).
Color and properties: Yellowish to red liquid, semi-solid or solid mass; poisonous!
Soluble in ether and in oils; insoluble in water.
Derivations: By mixing yellow mercuric oxide with oleic acid.
Strength of solutions: 5%; 10%; 15%; 20%.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: Class B poison.

Mercuric Oxide, Red (Red precipitate; Mercury oxide, red) HgO.
Color and properties: Heavy, bright, orange-red powder; very poisonous!
Constants: Sp.gr. 11.00 to 11.29 (11.08 at 27.5°C., 11.21 for finely ground); m.p.: Decomposes.
Soluble in acids; Soluble in dilute hydrochloric and nitric acids; slightly soluble in water, more so after boiling; insoluble in alcohol and ether.
Derivation: By heating mercurous nitrate.
Grades: Technical; C.P.; U.S.P.; N.F.
Containers: 1 lb. bottles; 1, 5, 25 lb. boxes; 200 lb. kegs.
Uses: Chemicals (oxidizing agent, mercury salts, manufacture of iodine derivatives of organic compounds, desulfurization of organic compounds); paint pigment; perfumery and cosmetics; pharmaceuticals; ceramics (pigment); batteries; polishing compounds; analytical reagent.
Railroad shipping regulations: Class B poison(?)*

Mercuric Oxide, Yellow (Hydrargyri oxidum flavum; Yellow precipitate) HgO.
Color and properties: Light, amorphous, orange-yellow powder, odorless. Stable in air but turns dark on exposure to light.
Constants: Sp.gr. 11.03 (27.5°C.); m.p.: Decomposes.
Slightly soluble in cold water, more so after boiling; soluble in dilute hydrochloric and nitric acids; potassium iodide solution; concentrated solutions of alkaline earth chlorides; magnesium chloride.
Derivation: (a) By the action of either potassium hydroxide or sodium hydroxide on mercuric chloride. (b) By the action of sodium carbonate upon mercuric nitrate solution. (c) By the action of potassium carbonate upon mercuric chloride solution.
Grades: C.P.; U.S.P.
Containers: 1, 5 lb. bottles.
Uses: Medicine (diseases of the eye and skin).
Railroad shipping regulations: None(?)*

Mercuric Oxycyanide $HgO.Hg(CN)_2$.
Color and properties: White crystalline powder.
Moderately soluble in water.
Uses: Medicine (treatment of syphilis, unofficial).
Railroad shipping regulations: Class B poison.

Mercuric-potassium Cyanide (Mercury-potassium cyanide) $Hg(CN)_2.2KCN$.
Color and properties: Colorless crystals; very poisonous!
Soluble in water and alcohol.
Derivation: By mixing mercuric and potassium cyanides and crystallizing.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Silvering glass in mirror manufacture.
Railroad shipping regulations: Class B poison.

Mercuric-potassium Iodide (Mayer's reagent) K_2HgI_4 or $2KIHgI_2$.
Color and properties: Yellow crystalline pieces, deliquescent in damp air. Crystallizes with either 1, 2, or 3 molecules of water. The commercial product is the anhydrous form containing about 25.5% mercury.
Soluble in water.
Derivation: (a) By evaporating Nessler's solution. (b) By the action of hydrochloric acid and potassium iodide on mercuric cyanide or mercuric chloride. (c) By the action of potassium iodide on mercuric oxide.
Grades: C.P.
Containers: 1 lb. bottles.
Uses: Medicine (powerful germicide used for the same purposes as mercuric chloride); chemical analysis.
Railroad shipping regulations: Class B poison.

Mercuric-potassium Thymol Sulfonate. See Thymegol.

Mercuric Rhodanide. See Mercuric sulfocyanate.

Mercuric Salicylarsenate. See Enesol.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Mercuric Salicylate (Salicylated mercury; Hydrargyri salicylas).
Color and properties: White powder, yellow or pink tinge. A compound of mercury and salicylic acid of somewhat varying composition, mercury replacing both phenolic and carboxylic hydrogen. Contains not less than 54% nor more than 59.5% mercury. Odorless, tasteless.
Soluble in solutions of the fixed alkalis or their carbonates, and in warm solutions of the alkali halides; almost insoluble in water and alcohol.
Derivation: By gently heating freshly precipitated yellow mercuric oxide and salicylic acid in presence of water.
Grades: U.S.P.
Containers: Ampules, capsules; 1 lb. bottles.
Uses: Medicine (antisyphilitic).
Railroad shipping regulations: Class B poison(?)*

Mercuric Subsulfate (Basic mercuric sulfate; Mercuric dioxysulfate; Turpeth mineral; Turbith mineral) $Hg(HgO)_2SO_4$.
Color and properties: Heavy, lemon-yellow powder or bright yellow scales. Poisonous! Turns red and brown on heating, yellow on cooling. Volatile at red heat, decomposing into mercury, mercurous sulfate, oxygen and sulfur dioxide.
Constants: Sp.gr. 6.444 (8.319 at 3.9°C.).
Soluble in sulfuric acid, dilute hydrochloric acid, dilute nitric acid, acetic acid; very slightly soluble in water, more so in hot water.
Derivation: Addition of water to normal mercuric sulfate.
Uses: Medicine (true croup, emetic, unofficial).
Railroad shipping regulations: Class B poison(?)*

Mercuric Succinimide. See Hydrargol.

Mercuric Sulfate (Mercury persulfate; Mercury sulfate; Mercury bisulfate) $HgSO_4$.
Color and properties: White, crystalline powder; poisonous!
Constants: Sp.gr. 6.466; m.p.: Decomposes at red heat.
Soluble in acids; insoluble in alcohol.
Derivation: By the action of sulfuric acid on mercury, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. jars; 100 lb. kegs.
Uses: Medicine; producing calomel and corrosive sublimate; catalyst in the conversion of acetylene to acetaldehyde; extracting gold and silver from roasted pyrites; galvanic batteries.
Railroad shipping regulations: Class B poison.(?)*

Mercuric Sulfate, Basic. See Mercuric subsulfate.

Mercuric Sulfide, Black (Ethiops mineral; Mercury sulfide, black) HgS.
Color and properties: Black powder; poisonous!
Constants: Sp.gr. 7.55 to 7.70; m.p.: Sublimes at 446°C.
Soluble in sodium sulfide solution; insoluble in water, alcohol and nitric acid.
Derivation: By passing hydrogen sulfide gas into a solution of a mercury salt.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Pigment for coloring horn.
Railroad shipping regulations: Class B poison.(?)*

Mercuric Sulfide, Red (Vermilion; Quicksilver vermilion; Chinese vermilion; Red mercury sulfide; Artificial cinnabar. Red mercury sulfuret) HgS.
Color and properties: Fine, bright scarlet powder; poisonous!
Constants: Sp.gr. 8.06 to 8.12; m.p.: Sublimes at 446°C.
Insoluble in water and alcohol.
Derivation: By heating mercury and sulfur, with subsequent recovery by sublimation.
Method of purification: Resublimation.
Grades: Technical; C.P.
Containers: Wooden kegs; glass bottles.
Uses: Medicine; paint pigment; rubber pigment; plastics (pigment); coloring sealing-wax.
Railroad shipping regulations: Class B poison.

Mercuric Sulfocyanate (Mercuric sulfocyanide: Mercuric rhodanide; Mercury sulfocyanate; Mercury sulfocyanide; Mercury rhodanide) $Hg(SCN)_2$.
Color and properties: White powder; poisonous!
Constants: M.p.: Decomposes.
Soluble in alcohol; slightly soluble in water.
Derivation: By precipitation of mercuric nitrate with ammonium sulfocyanate and subsequent solution in a large amount of hot water and crystallizing.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Photography; producing "Pharaoh's serpents."
Railroad shipping regulations: None.*

Mercuric Sulfocyanide. See Mercuric sulfocyanate.

Mercuriol. Mercury amalgam with aluminum used in medicine. Unofficial.

Mercurio-Vegetal. See Manaca.

Mercurius Vitae. See Antimony oxychloride.

Mercurochrome, 220 Soluble. See 2:7-Dibromo-4-hydroxymercurifluorescein, disodium salt.

Mercurol (Mercury nucleate; Hydrargyri nucleinas).
Color and properties: Colorless or brownish-white powder. Contains 20% mercury. Used internally or locally as a substitute for corrosive sublimate. Does not coagulate albumin. Unaffected by hydrogen sulfide.
Soluble in water, insoluble in alcohol.
Uses: Medicine (local antiseptic; hypodermic treatment of syphilis, unofficial).
Railroad shipping regulations: Class B poison(?)

Mercurosal (Disodiumhydroxymercurisalicyloxyacetate) $(HOHg)NaOOCC_6H_3OCH_2COONa$.
Color and properties: White, amorphous powder. Contains 43 to 43.8% mercury. Contains four-sevenths as much mercury as mercuric chloride but is only one-seventh as toxic. Solutions are stable for a limited time. Non-corrosive, does not precipitate blood serum, decomposed by acids and strong reducing agents.
Soluble in water, insoluble in organic solvents.
Containers: Ampules, sealed tubes.
Uses: Medicine (hypodermic treatment of syphilis, unofficial).

Mercurous Bromide HgBr or Hg_2Br_2.
Color and properties: (a) White powder resembling calomel. (b) White fibrous mass. (c) Small colorless crystals. (d) White tetragonal plates. Odorless, tasteless. Becomes yellow on heating, returning to white on cooling.
Constants: Sp.gr. 7.307; sublimes at 340° to 350°C.; m.p. 405°C.
Soluble in fuming nitric acid (prolonged heating), hot concentrated sulfuric acid, hot ammonium carbonate or ammonium succinate solutions; sparingly soluble in water.
Derivation: (a) Action of potassium bromide on solution of mercurous nitrate in dilute nitric acid. (b) Sublimation from mixture of mercury (gram-atom) and mercuric bromide (mol). (d) Cooling a hot solution of the salt in mercurous nitrate.
Uses: Medicine.
Railroad shipping regulations: Class B poison(?)*

Mercurous Chloride (Mercury monochloride; Mercury chloride, mild; Calomel; Hydrargyri chloridum mite; Hydrargyri subchloridum) Hg_2Cl_2.
Color and properties: White, rhombic crystals or crystalline powder; non-poisonous. For the natural product see Calomel, native.
Constants: Sp.gr. 6.993; m.p.: Sublimes at from 400° to 500°C. without melting.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Insoluble in water, alcohol and ether.

Derivation: By heating mercuric chloride and mercury, with subsequent sublimation.

Method of purification: Sublimation.

Impurities: Mercuric chloride.

Grades: Technical; C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 1, 5, 25 lb. boxes; 100 lb. kegs; 250 lb. barrels.

Uses: Medicine (alterative, cathartic, diuretic); pyrotechnics.

Railroad shipping regulations: None.*

Mercurous Iodide (Hydrargyri iodidum flavum) HgI or Hg_2I_2

Color and properties: Bright yellow, amorphous powder, becoming greenish on exposure to light due to decomposition into metallic mercury and mercuric iodide. Becomes dark yellow, orange and orange-red on heating. Undergoes same color change in opposite order on cooling. Odorless, tasteless.

Constants: Sp.gr. 7.6445 to 7.75; sublimes at 110° to 120°C.; m.p. 290°C. (with partial decomposition); b.p. 310°C.

Soluble in castor oil, liquid ammonia, aqua ammonia; insoluble in water, alcohol, ether.

Derivation: (a) Action of potassium iodide on a mercurous salt. (b) Boiling a solution of mercurous nitrate containing nitric acid with excess of iodine.

Grades: Technical; U.S.P.

Containers: Bottles; jars; kegs.

Uses: Medicine (advanced syphilis).

Railroad shipping regulations: Class B poison(?)*

Mercurous Iodobenzol-para-sulfonate. See Anogon.

Mercurous Nitrate (Hydrated) $HgNO_3.H_2O$.

Color and properties: Short prismatic crystals; effloresces and becomes anhydrous in dry air.

Constants: Sp.gr. 4.785 (3.9°C.); m.p. 70°C.

Soluble in small quantities of warm water (hydrolyzes in larger quantities), water acidified with nitric acid, boiling carbon bisulfide, methylamine; slightly soluble in benzonitrile; insoluble in liquid ammonia.

Derivation: By the action of cold dilute nitric acid upon an excess of mercury and warming slightly.

Grades: Technical; C.P.

Containers: Bottles; jars; kegs.

Uses: Medicine; cosmetics; analytical reagent.

Railroad shipping regulations: Class B poison.

Mercurous Oxide, Black (Hahnemann's soluble mercury; Black precipitate; Ammoniated mercury nitrate; Oxydi-mercurous-ammonium nitrate) $Hg_2ONH_2Hg_2NO_3$.

Color and properties: Black to grayish-black powder; poisonous!

Soluble in acids; insoluble in water and alcohol.

Derivation: By adding ammonium hydroxide to a solution of mercuric nitrate.

Grades: Technical.

Containers: Dark amber glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Mercurous Sulfate $Hg_2(SO_4)_2$.

Color and properties: White crystalline powder

Constants: Sp.gr. 8.353 (21°/19°), 7.121 (15°C.), 7.560 (3.9°C.).

Soluble in hot sulfuric acid, dilute nitric acid; almost insoluble in water.

Derivation: (a) Dissolving mercury in sulfuric acid (2:3) and heating gently. (b) Adding sulfuric acid to mercurous nitrate solution.

Grades: Technical; C.P.

Containers: 1, 5 lb. bottles.

Uses: Chemical (admixed with sulfuric acid as a catalyst, oxidation of napthalene to phthalic acid); laboratory batteries (Clark cell, Weston cell).

Railroad shipping regulations: Class B poison(?)*

Mercurous Tannate. See Hydrargotin.

Mercury (Quicksilver; Hydrargyrum) Hg.

Color and properties: A silvery, liquid, metallic element, sometimes found native; poisonous! See also Amalgam, Cinnabar, Eglestonite, Kleinite, Metacinnabarite, Montroydite, Terlinguaite, Tiemannite.

Constants: Sp.gr. 13.5953; m.p. −38.85°C.; b.p. 357.33°C.

Soluble in acids; insoluble in water, alcohol and ether.

Derivation: By heating cinnabar in air, or with lime. Found in United States (California), China, Czechoslovakia, Italy, Japan, Mexico, New Zealand, Russia, Spain.

Method of purification: Distillation.

Grades: Technical; U.S.P.

Containers: 1 lb. bottles; 5, 10, 20 lb. jugs; 75 lb. flasks.

Uses: Mercury salts; thermometers; medicine; mirror manufacture; mercury vapor lamps (Cooper-Hewitt, etc.); amalgams; extraction of gold and silver from their ores; physical and chemical apparatus; catalyst; production of fulminate, and vermilion; electric rectifiers; pharmacy; cathode in electrolytic chemical processes; felt manufacture; boiler compounds; cosmetics.

Railroad shipping regulations: None.*

Mercury Acetate. See Mercuric acetate.

Mercury, Ammoniated. See Mercuric-ammonium chloride.

Mercury-Ammonium Chloride. See Mercuric-Ammonium chloride.

Mercury Atoxylate (Mercury para-aminophenylarsenate; Aspirochyl; Asiphyl) $C_{12}H_{14}O_6N_2As_2Hg$.

Color and properties: White powder containing 31.8% mercury. Used as a 10% suspension in olive oil, or as a 5% ointment.

Uses: Medicine (intramuscular injection in syphilis, unofficial).

Railroad shipping regulations: None (?)*

Mercury Benzoate. See Mercuric benzoate.

Mercury Bichloride. See Mercuric chloride.

Mercury Biniodide. See Mercuric iodide.

Mercury Bisulfate. See Mercuric sulfate.

Mercury Bromide. See Mercuric bromide.

Mercury Chloride. See Mercuric chloride and Mercurous chloride.

Mercury Chloride, Ammoniated. See Mercuric-ammonium chloride.

Mercury Chloride, Corrosive. See Mercuric chloride.

Mercury Chloride, Mild. See Mercurous chloride.

Mercury, Cosmetic. See Mercuric-ammonium chloride.

Mercury Cyanide. See Mercuric cyanide.

Mercury Fulminate $Hg(CNO)_2$.

Color and properties: Dark brown, crystalline powder; explodes when dry under the slightest friction or shock; must be kept moist until used.

Constants: Sp.gr. 4.42; m.p.: Explodes.

Soluble in alcohol, ammonium hydroxide and hot water; slightly soluble in cold water.

Derivation: By acting on mercury with strong nitric acid and alcohol.

Grades: Technical.

Containers: Canvas bags in stone crocks filled with water; in lots of five pounds in glass bottles.

Uses: Manufacture of caps and detonators for producing explosions for military, industrial and sporting purposes.

Fire hazard: Dangerous.*

Railroad shipping regulations: Explosive regulations.

Mercury, Hahnemann's Soluble. See Mercurous oxide, black.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Mercury, Horn. See Calomel, native.

Mercury Imidosuccinate. See Hydrargol.

Mercury Iodide, Red. See Mercuric iodide.

Mercury Iodide, Yellow. See Mercuric iodide.

Mercury Monochloride. See Mercurous chloride.

Mercury Nitrate. See Mercuric nitrate.

Mercury Nitrate, Ammoniated. See Mercurous oxide, black.

Mercury Nucleate. See Mercurol.

Mercury Nucleoprotein. See Levurargyre.

Mercury Oleate. See Mercuric oleate.

Mercury Oxide, Black. See Mercurous oxide, black.

Mercury Oxide, Red. See Mercuric oxide, red.

Mercury Oxide, Yellow. See Mercuric oxide, yellow.

Mercury Para-aminophenyl Arsenate. See Mercury atoxylate.

Mercury Pernitrate. See Mercuric nitrate.

Mercury Persulfate. See Mercuric sulfate.

Mercury-Potassium Cyanide. See Mercuric-potassium cyanide.

Mercury Potassium-para-nitrophenol Sulfonate. See Phenegol.

Mercury Protochloride. See Mercuric chloride.

Mercury Protoiodide. See Mercuric iodide.

Mercury Rhodanide. See Mercuric sulfocyanide.

Mercury, Salicylated. See Mercuric salicylate.

Mercury, Soluble, Hahnemann's. See Mercurous oxide, black.

Mercury Sulfate. See Mercuric sulfate.

Mercury Sulfide, Black. See Mercuric sulfide, black.

Mercury Sulfide, Red. See Mercuric sulfide, red.

Mercury Sulfocyanate. See Mercuric sulfocyanate.

Mercury Sulfocyanide. See Mercuric sulfocyanate.

Mercury Sulfuret, Red. See Mercuric sulfide, red.

Mercury Tetraiodophenolphthalein. See Apallagin.

Mergal.
Color and properties: Yellow, white, light powder, consisting of a 1:2 mixture of mercuric cholate and albumin tannate. Contains about 4.4% mercury.
Insoluble in water and alcohol; almost insoluble in salt solution.
Containers: Capsules.
Uses: Medicine (antisyphilitic, unofficial).
Railroad shipping regulations: None (?)*

Mesotan. See Salicylic acid methoxymethyl ester.

Mesquite Gum.
Color and properties: Irregular, colorless or dark amber-brown round pieces. Resembles gum Arabic in solubility.
Derivation: From Prosopis juliflora DC., found in New Mexico, Texas and southwestern United States.
Railroad shipping regulations: None.*

Meta- Compounds. For definition of meta compounds see under orthocompounds. For meta compounds see specfic compound as Meta-cresol see Cresol, meta-.

Metacetone. See Diethylketone.

Metacetonic Acid. See Acid propionic.

Metacinnabarite. A mineral of the same composition as cinnabar (q.v.) but black in color. Occurs with cinnabar. A variety, guadalcazarite, contains some selenium and zinc. Used as a source of mercury.

Metahewettite. See Hewettite.

Metal, Dutch. See Dutch metal.

Metal Protection. See Cadmium plating, Calorizing, Chromium plating, Copper plating, Galvanizing, Lead coating, Lead lining, Lead burning, Metal spraying, Nickel plating, Rubber-covered metal, Rubber-plated metal, Sherardizing, Zinc plating.

Metal Spraying. A method of spraying metal through a gun for the purpose of coating different objects. The gun commonly used is the gas gun. In this gun the metal to be sprayed is introduced in the form of wire through a central tube. Through an annular space surrounding this tube a gaseous mixture, either hydrogen or acetylene with oxygen or air is passed, which upon burning at the orifice melts the wire in the inner part of the conical flame. Compressed air or other gas is passed through an outer annular space for the purpose of atomizing and spraying the metal as it is melted. An electrical gun using the electric arc for melting has also been developed but it is believed that it is still more or less in the experimental stage.

The metal spraying process has been very thoroughly discussed by Rawdon ("Protective Metallic Coatings," New York, Chemical Catalog Company, Inc., 1928. In part, he says "the amount of metal added as a coating by metal spraying can be controlled within rather narrow limits. In this respect the method is excelled only by electroplating. The coating may vary from a very thin film forming a suitable surface for holding a paint coat (which has been advocated, as economical and feasible) to relatively thick coatings, for example, several millimeters thick, for the protection of chemical equipment.

"Another very valuable feature of the process is the control of the composition of the coating. Not only may coatings of the purest metal available be applied, approaching thus the results of the electroplating method, but two metals may be applied simultaneously or successively without any inconvenience or delay. For example, a combination of zinc and aluminum (a coating of zinc followed by one of aluminum) has been found very suitable for resisting the corrosive attack of atmospheres high in sulfur dioxide.

"A sprayed coating as a rule is very uniformly distributed both in the depressions as well as on elevations. If for any reason a thicker coating is desired on certain parts, such as those exposed to wear, than on others, this is readily accomplished.

"The metal-spraying process has been used to a considerable extent abroad, especially in Germany and France, for the zinc coating of large constructions, and such applications have definitely passed the experimental stage. Included among such large-scale applications are the zinc coating of towers for electrical transmission lines and radio stations, the spraying of the hulls of ships, of dock gates, of bridges and tunnel construction, and of the entire under framework of street cars, as well as tank cars and large storage tanks. In all such cases, the surface must be prepared by sand blasting before it is sprayed. This adds considerably to the cost but the claim is made that the long life of such coatings compensates for the higher initial cost. The fact that all rivet and bolt heads as well as all cut edges are coated is of very considerable importance. The excellent 'paint holding' properties of a sprayed-zinc coating as compared with those of a galvanized coating are also decidedly in favor of the spraying process for those constructions which are to be painted.

"The small scale applications of metal spraying are exceedingly varied and numerous. Many such applications are for ornamentation. This was true especially in the early development of the process since it can be applied to such materials as wood, paper, textiles, etc. The use of metal spraying as a supplement to other coating processes is of interest. For example, sherardized castings not infrequently show spots where the coating is either very thin or lacking entirely. Such areas can be easily and quickly covered by metal spraying and rejections, because of imperfect coatings, can be almost entirely eliminated.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

"The use of the process in connection with the carburization of steel has already been referred to. Guillet and Bernard have shown that a layer of sprayed copper 0.02 to 0.04 mm. thick offers ample resistance to the penetration of carburizing gases at 1,000°C., and hence can be used for coating those portions of a steel article which are to remain soft after the case-hardening process.

"The use of the metal-spraying process for the coating of aluminum with other metals and for the production of aluminum coatings on other metals constitutes one of the most important applications of this process. Coatings of pure aluminum can be obtained in almost no other way. Such coatings are being used to a moderate extent with pronounced success for the protection of grate bars and other furnace parts at elevated temperatures. When heated such coatings form a tough adherent oxide layer; alloying with the base metal also occurs. It may be considered, therefore, that a calorized layer is produced. The life of such sprayed aluminum coatings is very much less than that of the regular calorized product but likewise the initial cost and the cost of renewal is correspondingly much less.

"The successful coating of aluminum with another metal is a matter of considerable difficulty. Electroplating of aluminum is the only method other than metal spraying that can be depended upon except for simple shapes such as sheets and most electroplated aluminum has not proved satisfactory when exposed to severely corrosive conditions. The protection of aluminum and light aluminum alloys against atmospheric corrosion is a problem of increasing importance as the development of aircraft progresses. The use of metal-sprayed coatings on such parts appears very promising. Duralumin or other alloys which must be heat-treated in order to develop their highest tensile properties can be heat-treated after being sand-blasted and metal-sprayed. This, incidentally, removes the undesirable effect of the sand-blasting process.

"Lead coatings are another type of coating for which the metal-spraying process is admirable. The use of this process for the lead coating of chemical equipment constitutes another very important application of the process.

"On the whole, it seems that the metal-spraying process has not yet settled down into its proper place. This is only a matter of time, however, since the value, importance and practicability for many purposes of the metal-spray method has been demonstrated again and again."

Metallic Foils. There are four principal kinds of foil, viz., pure tin foil, aluminum foil, lead foil, and those made from an alloy of lead and tin. In addition there is used, sometimes, a tin-lead foil produced from the rolling of lead and tin sheets together to give a tin surface to a lead sheet. The usual thickness of foil is from 3.5 to 8 mils (0.0035 to 0.0080 in.). The presence of minute perforations in the finished sheet is the chief defect met with since, with exceedingly thin material, immunity from pinholes is not easily obtained.

Uses: Wrapping food products, tobaccos, soaps and the like; electrical condensers; novelties; stereotyping and electrotyping; collapsible tubes.

Note: Foils containing lead are poisonous. While it is believed they may be used in the United States for wrapping edibles, if backed with paper, many countries have passed food laws which prohibit the use of any wrapping containing lead even when paper mounted.

Metals, Fusible. See Fusible metals.

Metanilic Acid (Meta-sulfanilic acid; Meta-aminobenzenesulfonic acid) $C_6H_4(NH_2)SO_3H$.

Color and properties: Small colorless needles.

Soluble in water, alcohol and ether.

Derivation: By the reduction of meta-nitrobenzenesulfonic acid. Nitrobenzene is sulfonated until the product is soluble in water. The mixture is then poured into water and reduced with iron, made alkaline with lime and the lime salt dissociated with sodium carbonate.

Grades: Technical.

Containers: 250,300 lb. barrels.

Uses: Dyes; medicine.

Railroad shipping regulations: None.*

Meter Oil. A low cold-test oil is used for this purpose. See Ice-machine oils.

Methacetin (Acetanisidine; Para-oxymethylacetanilide) $CH_3OC_6H_4NHC_2H_3O$.

Color and properties: White, crystalline powder; feebly bitter taste.

Constants: M.p. 127.1°C.

Soluble in alcohol, acetone and dilute acids; insoluble in water.

Derivation: By the acetylation of para-anisidine.

Grades: Technical; pure.

Containers: Tins; glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Methanamide. See Formamide.

Methane (Marsh gas; Hydrogen bicarbide) CH_4.

Color and properties: Odorless, tasteless, inflammable gas; slight garlicky odor; condensible with great difficulty; forms an explosive mixture with air.

Constants: Sp.gr. (liquid) 0.5542; m.p. —184°C; b.p. —160°C.

Soluble in alcohol and ether; slightly soluble in water and fuming sulfuric acid.

Derivation: Methane occurs in all coal mines. Mixed with air it forms fire-damp, the cause of most coal-mine explosions. It is the chief constituent of most natural gas, and of manufactured fuel and illuminating gas. As such, it is not an article of commerce.

Methane-hydrogen Gas

A gas made by vaporizing tar and passing it through a bed of incandescent fuel. A typical gas will analyze 3.0% illuminants, 15.0% carbon monoxide, 64.2% hydrogen, 12.0% methane, 2.3% carbon dioxide, 0.2% oxygen, 3.0% nitrogen. Candlepower, 11; B.t.u., 400.

Uses: Industrial and domestic heating and lighting.

Railroad shipping regulations: Red gas label.

Methanecarboxylic Acid. See Acetic acid.

Methanedicarbonic Acid. See Malonic acid.

Methanethiomethane. See Methyl sulfide.

Methanol. See Methyl alcohol.

Methenamine. See Hexamethylenetetramine.

Methenyl Tribromide. See Bromoform.

Methenyl Trichloride. See Chloroform.

Methenyl Triïodide. See Iodoform.

Methoxyacetyl-para-phenetidine. See Kryofin.

Methoxybenzene. See Xylene.

Methoxybenzaldehyde, Para-. See Anisic aldehyde.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Methoxypropenylbenzene, Para-. See Anethole.

Methozin. See Antipyrine.

Methyl Acetanilide (Exalgin) $C_6H_5N(CH_3)COCH_3$.
Color and properties: Needles or long tablet-like crystals.
Constants: B.p. 240 to 250°C.
Soluble in hot water and dilute alcohol.
Derivation: By heating acetylchloride and methylaniline.
Uses: Medicine (analgesic and antispasmodic, unofficial).
Railroad shipping regulations: None.*

Methyl Acetate $CH_3CO_2CH_3$.
Color and properties: Colorless, volatile, inflammable, liquid; fragrant odor.
Constants: Sp.gr. 0.92438; m.p. −98.05°C.; b.p. 54.05°C.
Soluble in water, alcohol and ether.
Derivation: By heating methyl alcohol and acetic acid in presence of sulfuric acid and distilling.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Solvent; extracts; perfumery; artificial leather; plastics; solvent for nitrocellulose and acetyl cellulose.
Fire hazard: Dangerous.*
Railroad shipping regulations. Red label.

Methylacetic Acid. See Propionic acid.

Methyl Acetone. A water-white, anhydrous liquid, containing from 70 to 80% of combined acetone and methyl acetate, the acetone constituting about two-thirds of the mixture.
Grades: Technical.
Containers: 55,110 gal. drums.
Uses: Solvent for nitrocellulose, rubber, gums, resins, extracting perfumes; varnish remover; extracts; artificial leather; gas mantles.
Railroad shipping regulations: Red label.

Methylacetophenone.
Color and properties: Colorless or pale yellow liquid; fragrant, coumarin odor.
Derivation: Action of acetic anhydride on toluene.
Uses: Perfumery.
Railroad shipping regulations: None.*

Methylacetyl. See Acetone.

Methylal (Methylenedimethyl ester; Formal; Methylenedimethylate) $CH_2(OCH_3)_2$.
Color and properties: Colorless, volatile, inflammable liquid; chloroform-like odor; pungent taste.
Constants: Sp.gr. 0.855°C.; b.p. 42°C.
Soluble in water, alcohol and ether.
Derivation: By distilling methyl alcohol, with sulfuric acid and manganese dioxide.
Method of purification: Rectification.
Grades: Technical.
Containers: Steel drums; glass bottles.
Uses: Medicine (hypnotic, unofficial); perfumery; organic synthesis; solvent.
Fire hazard: Dangerous.*
Railroad shipping regulations. Red label.

Methyl Alcohol (Methanol; Wood alcohol; Wood spirit; Wood naphtha; Methyl hydroxide; Methyl hydrate; Columbian spirits; Columnian spirits; Acetone alcohol; Colonial spirits; Manhattan spirits; Standard wood spirits; Green wood spirits) CH_3OH.
Color and properties: Clear, colorless, mobile, volatile, inflammable liquid; poisonous!
Constants: Sp.gr. 0.7913; m.p. −97.8°C.; b.p. 66.78°C.
Soluble in water, alcohol and ether.
Derivation: (a) Pyroligneous acid obtained from destructive distillation of wood is neutralized with lime and the methyl alcohol distilled off. The distillate is purified by dilution with water, to effect a separation of acetones and hydrocarbon oils. The liquid is redistilled over lime in a rectifying still and then filtered through a tower containing charcoal to remove the coloring matter and unpleasant odor. By distilling again over lime, methyl alcohol of 99% is obtained. (b) Made synthetically (1) by passing a mixture of carbon monoxide and hydrogen under pressure and at an elevated temperature over a catalyst; (2) by using a mixture of carbon dioxide and hydrogen.
Method of purification: Rectification.
Grades: Pure (acetone-free); crude (wood spirit); C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 1, 2, 3, 5, 10 gal. cans; 50 gal. barrels; 55,110 gal. drums; 8,000 gal. tank cars.
Uses: Manufacturing formaldehyde; organic synthesis; denaturing ethyl alcohol; general solvent; fuel; smokeless powders; paints, varnishes, paint removers; polishing and cleansing preparations; transparent and disinfecting soaps; dry cleaning; antifreeze; fuel compositions used for heating and illuminating; perfumery; also some of the uses given under ethyl alcohol.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Methylaminoethanolcatechol, Levo-. See Adrenalin.

Methylaminophenol Sulfate, Para- $C_6HNCH_3SO_4$.
Color and properties: White needles.
Constants: M.p. 250° to 260°C.
Soluble in water and alcohol.
Derivation: By the action of sulfuric acid on methyl-para-aminophenol.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Photographic developer.
Railroad shipping regulations: None.*

Methylamylketone $C_5H_{11}COCH_3$.
A ketone found in oil of cloves.
Constants: Sp.gr. 0.837 (50°C.); b.p. 151°C.
Railroad shipping regulations: None (?)*

Methylaniline $C_6H_5NH(CH_3)$.
Color and properties: Reddish-brown, oily liquid.
Constants: Sp.gr. 0.991; m.p. −80°C.; b.p. 190° to 191°C.
Soluble in alcohol, ether and chloroform; slightly soluble in water.
Derivation: By heating methyl iodide with aniline and subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Methyl Anthranilate $H_2NC_6H_4CO_2CH_3$.
Color and properties: Colorless crystals; orange-flower odor.
Constants: Sp.gr. 1.168; m.p. 24.5°C.; b.p. 125°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By heating anthranilic acid and methyl alcohol in presence of sulfuric acid, with subsequent distillation. Occurs naturally in many flower oils.
Method of purification: Recrystallization.
Grades: Technical.
Containers: 1, 5, 10 lb. bottles; 25 lb. tins; 50 lb. cases; 100 lb. drums.
Uses: Flavoring; perfume in cosmetics and pomades.
Railroad shipping regulations: None.*

Methylanthraquinone $CH_3C_6H_3(CO)_2.C_6H_4$.
Color and properties: White needles.
Constants: M.p. 177°C.; b.p.: Sublimes.
Soluble in ether and benzene; very slightly soluble in alcohol.
Derivation: By heating anthraquinone and methyl alcohol in presence of sulfuric acid.
Method of purification: Crystallization.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Wooden barrels.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Methylated Spirits. See Denatured alcohol.

Methylatophan. See 6-Methyl-2-phenylquinoline-4-carboxylic acid.

Methylbenzene. See Toluene.

Methyl Benzoate (Niobe oil) $C_6H_5CO_2CH_3$.
Color and properties: Colorless, oily.
Constants: Sp.gr. 1.0937; m.p. —12.3°C.; b.p. 198.6°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: (a) By heating methyl alcohol and benzoic acid in presence of sulfuric acid. (b) Passing dry hydrogen chloride through a solution of benzoic acid in methanol. (c) Occurs naturally in oils of clove, ylang ylang, tube rose.
Method of purification: Rectification.
Grades: Technical.
Containers: 5, 10 lb. bottles; 40 lb. tins.
Uses: Perfumery.
Railroad shipping regulations: None.*

Methylbenzoic Acid. See Toluic acid, ortho-.

Methylbenzol. See Toluene.

Methylbenzoylecgonine. See Cocaine.

Methyl Benzoylsalicylate. See Benzosalin.

Methyl-beta-naphtholate. See Naphtholmethyl ether, beta-.

Methyl Blue. Sodium triphenyl-para-rosaniline sulfonate, a dark blue powder or dye used in medicine as an antiseptic and in biological and bacteriological stains.

Methyl Bromide (Bromomethane) CH_3Br.
Color and properties: Colorless, transparent, volatile liquid; burning taste; chloroform-like odor.
Constants: Sp.gr. 1.732; m.p. —84°C.; b.p. 4.5°C.
Soluble in alcohol and ether; forms a voluminous crystalline hydrate with cold water.
Derivation: By the action of bromine on methyl alcohol in presence of phosphorus, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Steel cylinders.
Uses: Organic synthesis.
Railroad shipping regulations: Green gas label(?)*

Methyl Caprinate.
A liquid of floral, fruity odor.
Uses: Perfumery.
Railroad shipping regulations: None.*

Methylcatechol. See Guaiacol.

Methyl Chloride (Chloromethane) CH_3Cl.
Color and properties: Colorless, non-corrosive, liquefiable gas which is transparent in both the gaseous and the liquid state. Faintly sweet, ethereal odor; non-irritant to eyes or lungs.
Constants: Sp.gr. 0.92 at 20°C.; b.p. —23.7°C. (760 mm.); m.p. —97.6°C. (760 mm.); critical temperature, 143°C.; critical pressure 970 lbs. per sq. in. absolute; specific heat ($Cp=0.24$, $Cv=0.20$) $Cp/Cv=1.20$.
Soluble in water, alcohol, chloroform.
Derivation: By the action of hydrochloric acid on methyl alcohol in presence of sulfuric acid.
Grades: Technical.
Containers: 90 lb. cylinders.
Uses: Refrigerant; medicine.
Fire hazard: Moderately inflammable.*
Explosive hazard: Moderate; explosions stated to be practically impossible in household refrigeration installations.
Railroad shipping regulations. Red gas label.

Methylchlorosulfonate CH_3ClSO_3.
A military poison gas used in the late war.

Methyl Cinnamate $C_6H_5CH.CHCO_2CH_3$.
Color and properties: Colorless crystals; strawberry-like odor.
Constants: Sp.gr. 1.0415; m.p. 36°C.; b.p. 259.6°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating methyl alcohol, cinnamic acid and sulfuric acid, with subsequent distillation.
Method of purification: Recrystallization.
Grades: Technical.
Containers: 1, 5, 10 lb. bottles; 25 lb. tins.
Uses: Perfumes; flavoring; confectionery.
Railroad shipping regulations: None.*

Methylcinnamylketone. See Benzylideneacetone.

Methylcrotonic Acid. See Tiglic acid.

Methyl Cyanide (Acetonitrile) CH_3CN.
Color and properties: Colorless, limpid liquid; aromatic odor; poisonous!
Constants: Sp.gr. 0.7897; m.p. —41°C.; b.p. 83°C.
Soluble in water and alcohol.
Derivation: By heating acetamide with glacial acetic acid.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis; perfumes; extracts; denaturant.
Railroad shipping regulations: Class B poison(?)*

Methyldichloroarsine CH_3AsCl_2.
A military poison gas used in the late war.

Methyldivinyl, Beta-. See Isoprene.

Methylene Bichloride. See Methylene chloride.

Methylene Blue. See Methylthionine chloride.

Methylene Chloride (Methylene bichloride; Dichloromethane) CH_2Cl_2.
Color and properties: Colorless, volatile liquid; poisonous when inhaled!
Constants: Sp.gr. 1.2615; m.p. —97°C.; b.p. 42°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the chlorination of methyl chloride and subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Railroad shipping regulations: None.*

Methylenecitrosalicylic Acid (Novaspirin; Salicitrin).
Color and properties: White, crystalline powder.
Constants: M.p. 150 to 152°C.
Soluble in alkaline solutions and alcohol; almost insoluble in water.
Uses: Medicine (similar to aspirin, antirheumatic, antineuralgic, asthma, unofficial).
Railroad shipping regulations: None.*

Methylene Dianiline.
Color and properties: Yellowish-white mealy compound which readily crushes in the hand.
Constants: Melting range starting not lower than 45.0°C.
Soluble in acetone alcohol.
Derivation. From aniline.
Grades: Technical.
Containers: Drums.
Uses: Vulcanization of rubber.
Railroad shipping regulations: None.*

Methylenediantipyrine. See Formopyrine.

Methylene Diguaiacol (Guaiaform; Geoform; Pulmoform)
Color and properties: Yellow powder; tasteless; odorless but gradually acquires vanilla odor; contains 95.38% guaiacol; non-irritant; non-toxic.
Soluble in alcohol, ether; insoluble in water.
Derivation: A guaiacol-formaldehyde condensation product.
Uses: Medicine (guaiacol substitute, unofficial).
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Methylene Diguaiacol, Acetylized. See Euguform.

Methylenedimethylate. See Methylal.

Methylenedimethyl Ester. See Methylal.

Methylene Disalicylic Acid (Formasal).
A condensation product of formaldehyde and salicylic acid. Several salts of this acid are on the market, including those of caffeine, bismuth and sodium. The salts are used in medicine (unofficial) as follows: The sodium salt as an antirheumatic and anti-neuralgic; the caffeine salt (soluble in water) as a means of injecting caffeine hypodermically; the bismuth salt as an intestinal antiseptic.
Railroad shipping regulations: None.*

Methylene Ditannin. See Tannoform.

Methylene Guaiacol, Acetylized. See Euguform.

Methylene Iodide (Diïodomethane) CH_2I_2.
Color and properties: Yellow liquid.
Constants: Sp.gr. 3.33; m.p. 4°C.; b.p. 180°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating iodoform with an alcoholic solution of sodium acetate and subsequent distillation.
Method of purification: Rectification.
Grades: Technical; C.P.
Containers: Steel drums; glass bottles.
Uses: Separating mixtures of minerals; organic synthesis.
Railroad shipping regulations: None.*

Methyl Ether. See Methyl oxide.

Methylethylcarbinol. See Butyl alcohol, secondary.

Methylethylene Glycol. See Propylene glycol.

Methylethyl Ketone (Ethylmethylketone) $CH_3COC_2H_5$.
Color and properties: Colorless liquid; acetone-like odor; inflammable.
Constants: Sp.gr. 0.808; b.p. 79.6°C.
Soluble in water, alcohol and ether.
Derivation: (a) From the butyl alcohol obtained as a by-product in the fermentation process of manufacturing acetone. (b) By heating methylacetoacetate with potassium hydroxide and subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Various tins; 350 lb. barrels; 70, 350, 700 lb. drums; tank cars.
Uses: Organic synthesis; manufacture of smokeless powder; solvent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Methylethylketone, Brominated. See Brominated methylethyl ketone.

Methyl Formate CH_3COOH.
Color and properties: Colorless liquid; agreeable odor.
Constants: Sp.gr. 0.9731; m.p. —99.75°C.; b.p. 31.75°C.
Soluble in water, alcohol and ether.
Derivation: By heating methyl alcohol with sodium formate and hydrochloric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Methyl Glycocoll. See Aminoacetic acid.

Methylglyoxalidine. See Lysidine.

Methyl Heptine Carbonate.
Color and properties: Colorless ethereal oil, sharp, unpleasant odor.
Derivation: From heptaldehyde.
Uses: Perfumery.
Railroad shipping regulations: None.*

Methyl Hexane. See Heptane.

Methyl Hydrate. See Methyl alcohol.

Methyl Hydroxide. See Methyl alcohol.

Methylhydroxyisopropylcyclohexane-para-mentheneol. See Menthol.

Methyl Iodide (Iodomethane) CH_3I.
Color and properties: Colorless liquid; turns brown on exposure to light.
Constants: Sp.gr. 2.2852; m.p. —66.1°C.; b.p. 45.35°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of methyl alcohol, sodium iodide and sulfuric acid, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Amber glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Methylmenthylsalicylate. See Menthyl-salicylic methyl ester.

Methyl-meta-amino-para-hydroxybenzoate. (Orthoform; Orthoform-new; Orthocaine) $C_6H_3COOCH_3NH_2OH$.
Color and properties: White powder, odorless, tasteless.
Constants: M.p. 141 to 143°C.
Soluble in alcohol; almost insoluble in water.
Uses: Medicine (local anesthetic, particularly useful in tuberculosis, laryngitis, cancerous sores, unofficial).
Railroad shipping regulations: None.*
Note: The term orthoform-new is sometimes applied to it to distinguish it from the older form.

Methylmorphine. See Codeine.

Methylnaphthyl Ketone.
Color and properties: White crystals, pleasant odor.
Uses: Perfumery (synthetic neroli, eau du cologne).
Railroad shipping regulations: None.*

Methylnitrobenzene. See Nitrotoluene.

Methylnitrobenzol. See Nitrotoluene.

Methylnonylketone $CH_3COC_9H_{19}$.
Color and properties: Oily liquid, strong odor.
Constants: Sp.gr. 0.8295 (17°C.); b.p. 225°C.
Derivation: A ketone found in oil of rue.
Railroad shipping regulations: None.*

Methyl Oxide (Methyl ether; Wood ether) $(CH_3)_2O$.
Methyl oxide is of no commercial importance. It is a gas, even at low temperature, and was used to a slight extent as an anesthetic some years ago.

Methyl-para-aminophenol $CH_3C_6H_3OHNHCH_2CO_2H$.
Color and properties: Colorless needles; poisonous!; solutions have irritating effect on the skin.
Constants: M.p. 184°C.
Soluble in water, alcohol and ether.
Derivation: (a) By the interaction of hydroquinone and methylamine. (b) By the methylation of para-aminophenol hydrochloride.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Organic synthesis; photographic developer.
Railroad shipping regulations: None.*

Methyl-para-aminophenol Sulfate (Elon; Metol) $HOC_6H_4NHCH_3 . \frac{1}{2} H_2SO_4$.
Color and properties: Colorless needles.
Soluble in water; insoluble in alcohol and ether.
Derivation: By methylation of para-aminophenol

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

and conversion of the resulting methylated base by neutralization with H_2SO_4.
Method of purification: Recrystallization from water.
Grades: C.P.; photographic.
Containers: Kegs; bottles.
Uses: Photographic developer.
Railroad shipping regulations: None.*

Methyl-para-oxybenzaldehyde. See Anisic aldehyde.

Methylphenol, Meta-, Ortho-, Para-. See corresponding cresol.

Methylphenyl Acetate. A liquid of honey-like odor. Used in perfumery.

Methylphenylformic Acid. See Toluic acid, ortho-.

6-Methyl-2-phenylquinoline-4-carboxylic Acid (Paratophan; Methylatophan; Homophan) $CH_3C_9H_4NC_6H_5COOH$.
Color and properties: Yellow crystalline powder.
Soluble in alcohol, ether, alkalis; insoluble in water.
Uses: Medicine (diuretic, gout, rheumatism, unofficial).
Railroad shipping regulations: None.*

Methylpropylbenzene, Para-. See Cymene.

Methylpropylcarbinol (Secondary normal amyl alcohol; 2-Pentanol) $CH_3CHOHC_3H_7$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.8102; b.p. 119°C.; weight per gal. 6.75 lb.
Derivation: Fractional distillation of pentasol (q.v.).
Grades: Technical.
Containers: 1, 5, 10, 50, 100 gal. drums.
Uses: Solvent for lacquers.
Railroad shipping regulations: None.*

Methylpropylcarbinolurethane. See Hedonal.

Methylpropylphenol. See Thymol.

Methylpropylphenyl Hexahydride. See Menthol.

Methylprotocatechuic Aldehyde. See Vanillin.

Methyl Pyridine, Alpha-. See Picoline.

Methylquinoline, Alpha-. See Quinaldine.

Methylquinoline, Gamma-. See Lepidine.

Methylresorcinol. See Orcin.

Methyl Salicylate (Synthetic wintergreen oil; synthetic gaultheria oil) $C_6H_4OHCOOCH_3$.
Color and properties: Colorless, liquid oil; odor of wintergreen.
Constants: Sp.gr. 1.1850; m.p. —8.3°C.; b.p. 222.2°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By heating methanol and salicylic acid in presence of sulfuric acid, or by distillation from leaves of Gaultheria procumbens or bark of Betula lenta.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; 10, 55 gal. tin-lined drums; 50 lb. crated tins.
Uses: Medicine (rheumatism); flavoring; perfumery; insecticides; polishes; printing and copying inks.
Railroad shipping regulations: None.*

Methylstyryl Ketone. See Benzylideneacetone.

Methylsuccinic Acid. See Pyrotartaric acid.

Methyl Sulfate. See Dimethyl sulfate.

Methyl Sulfide (Methanethiomethane; Dimethyl sulfide) $(CH_3)_2S$.
Color and properties: Colorless liquid; disagreeable odor.
Constants: Sp.gr. 0.845°C.; m.p. —83.2°C.; b.p. 37.5°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of a methyl alcohol solution of potassium sulfide and methyl chloride, with subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Steel drums.
Uses: Organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Methyltheobromine. See Caffeine.

Methylthionine Chloride (Methylene blue) $C_{16}H_{18}N_3ClS.3H_2O$ (Medicinal) $(C_{16}H_{18}N_3SCl)_2.ZnCl_2.H_2O$ (Dye).
Color and properties: Dark green crystals or powder with bronze-like luster.
Soluble in water, alcohol, chloroform.
Derivation: By oxidation of para-aminodimethylaniline with ferric chloride in the presence of hydrogen sulfide. The dye is the zinc chloride double salt of the base; the medicinal product is the hydrochloride of the base.
Grades: U.S.P.; technical.
Containers: 1 lb. bottles; 5, 10, 25 lb. cans; 100 lb. kegs.
Uses: Medicine (feeble antiseptic and analgesic); dyeing cotton and wool; biological and bacteriological stains; reagent in oxidation-reduction titrations in volumetric analysis; indicator.

Methyl Tribromosalol. See Cordeine.

Methyltrinitrobenzene. See Trinitrotoluene.

Methyl Trioxybenzophenone. See Cotoin.

Metol. See Methyl-para-aminophenol sulfate.

Metozin. See Antipyrine.

Mexican Scammony Root. See Jalap, Orizabo.

Mexico Seed. See Ricinus.

Mezereon. See Mezereum.

Mezereum (Mezereon; Olive spurge; Dwarf bay; Magell; Paradise plant; Spurge flax; Wild pepper). Dried bark of Daphne mezereum and other European species of Daphne.
Habitat: Europe, Siberia, Canada and New England.
Grades: Technical; N.F.
Containers: Bales.
Uses: Medicine (viscicant).
Railroad shipping regulations: None.*

Mica.
A class of silicates of widely varying composition. While very complex, they are essentially silicates of aluminum (sometimes partially replaced by iron, chromium, etc.) and an alkali, e.g., potassium, sodium or lithium. The chief varieties are:

Muscovite (Potassium mica; White mica; Muscovy glass) $H_2KAl_3(SiO_4)_3$. Gray, brown, green, yellow, violet, rarely rose-red; sp.gr. 2.76 to 3; hardness 2 to 2.5.

Paragonite (Sodium mica) $H_2NaAl_3(SiO_4)_3$. Gray, yellow, green; sp.gr. 2.78 to 2.90.

Lepidolite (Lithium mica) $KLi[Al(OHF)_2]Al(SiO_3)_3$. White, grayish-white, yellow, violet, gray, red; sp.gr. 2.8 to 2.9; hardness 2.5 to 4.

Zinnwaldite (Lithium-iron mica). Dark gray, yellow, brown, light-violet.

Biotite (Magnesium-iron mica) $(HK)_2(MgFe)_4(AlFe)_2(SiO_4)_4$ or $(HK)_2(MgFe)_2Al_2(SiO_4)_3$ with wide variation in iron content. The second formula corresponds to the average. Pale yellow, green, brown, black, rarely white; sp.gr. 2.7 to 3.1; hardness 2.5 to 3.

Phlogopite (Magnesium mica; Amber mica) $R_3Mg_3Al(SiO_4)_3$ where R=H,K,MgF. White or colorless, pale brownish-yellow, yellowish-brown, brownish-red, green; sp.gr. 2.78 to 2.85; hardness 2.5 to 3.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Lepidomelane (Iron mica). Near biotite but contains a high percentage of ferric iron.

Roscoelite (Vanadium mica). Essentially a muscovite but may contain up to 28.85% V_2O_3.

The only two of commercial importance are muscovite and phlogopite.

Occurrence: United States (New Hampshire, North Carolina, Virginia, South Dakota, New Mexico, Idaho, Colorado, Maine, Massachusetts, New York, Pennsylvania, Maryland, South Carolina, Georgia, Alabama), Austria, Switzerland, Ireland, England, Sweden, Norway, Greenland, East Indies, Brazil, South Africa, Argentine, Ceylon, China, Siberia, Japan.

Uses: Sheet (electrical insulation, glass substitute in stove doors, goggles, gas masks, screens, diver's helmet windows, conning towers, automobile-curtain windows, phonograph diaphragms, lamp chimneys, etc.). Ground (widely used for decorative purposes in paints, wall paper, tiles, stage scenery, concrete, also used in heat insulation, electrical insulation, rubber goods, calico printing, lubricants, roofing material). See also margarite, seybertite, chloritoid.

Micas, Brittle. A group of silicate minerals which may be classed as transition products from the micas proper to the chlorite minerals. They are near the micas in cleavage, crystalline form and optical properties, but are marked physically by the brittleness of the laminae, and chemically by their basic character. See margarite, seybertite, chloritoid. Less important members of this group are xanthophyllite, waluewite, Sismondine, salmite, masonite, ottrelite, venasquite, phyllite.

Michigan Slip Clay. See under Clays.

Michler's Hydrol. See Tetramethyldiaminobenzhydrol.

Michler's Ketone (Tetramethyldiaminobenzophenone) $(CH_3)_2NC_6H_4COC_6H_4N(CH_3)_2$.

Color and properties: Colorless, crystalline plates.

Constants: M.p. 174°C.

Soluble in alcohol; insoluble in water.

Derivation: Carbonyl chloride is passed into dimethylaniline at ordinary temperature, until the latter has increased 40% in weight and the mixture heated until the reaction is completed.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden barrels.

Uses: Dyes.

Railroad shipping regulations: None.*

Microcidine (Sodium beta-naphthol).

Color and properties: White powder, non-caustic, non-toxic. More powerful than phenol.

Soluble in water.

Uses: Medicine (intestinal antiseptic, unofficial).

Railroad shipping regulations: None.*

Microcline. See Feldspar.

Microcosmic Salt. Sodium-ammonium phosphate.

"Micronex." See under Blacks.

Middle Chrome. See Chrome yellows.

Middlings. The granular part of the interior of the wheat berry obtained in the process of milling. This product, when reduced by grinding to the desired fineness, produces the finest quality of flour.

Midvale Alloys. Ferrous alloys containing, in addition to iron, the following percentages of other metals: (a) Midvale ATV1 contains 33 to 39% nickel, 10 to 12% chromium, 1.1 to 1.8% manganese, 0.25 to 0.35% carbon. (b) Midvale ATV3 contains 25 to 28% nickel, 13 to 15% chromium, 3 to 4% tungsten, 1 to 1.5% manganese, 0.4 to 0.5% carbon. (c) Midvale BTG contains 60 to 62% nickel, 10 to 11% chromium, 2 to 2.5% tungsten, 1.2 to 1.5% manganese, 0.3 to 0.35% carbon. (d) Midvale HR contains 20% chromium, 7% nickel, 4% tungsten, 0.35% carbon, 0.5% manganese. (e) Midvale V_2A contains 17 to 19% chromium, 8 to 9% nickel, less than 0.5% manganese, 0.06 to 0.25% carbon.

Mignonette Oil. See Reseda oil.

Migrol (Pyrocatecholacetodimethylaminophenyldimethylpyrazolone).

Color and properties: Colorless crystals, intensely bitter taste, slight acid reaction.

Soluble in water, alcohol.

Uses: Medicine (antineuralgic, antirheumatic, unofficial).

Railroad shipping regulations: None.*

Milfoil. See Achillea.

Milk of Bismuth. See Magma.

Milk of Iron. See Magma.

Milk of Lime. Calcium hydroxide suspended in water. See Magma.

Milk of Magnesia. See Magma.

Milk of Sulfur. See Sulfur, precipitated.

Milk Opal. See Opal.

Milk Sugar. See Lactose.

Millerite (Capillary pyrites; Hair pyrites) NiS.

Brass- or bronze-yellow mineral of metallic luster. Contains 64.4% nickel. Soluble in aqua regia.

Constants: Sp.gr. 5.3 to 5.65; hardness 3 to 3.5.

Occurrence: United States (Pennsylvania, New York, Missouri, California), Germany, Bohemia, Canada.

Millon's Reagent. A reagent used in analytical work as a test for albumin. It is prepared by dissolving mercury in an equal weight of nitric acid of sp.gr. 1.41, diluting the solution to twice its volume, allowing to stand and then decanting the liquid from the precipitate.

Millstone. See Buhrstone.

Milorganite.

Trade name for an activated sludge marketed in dry granular form by the Milwaukee sewage disposal plant. Contains 5 to 10% moisture, 6.5 to 7.5% ammonia, 2.5 to 3.5% available phosphoric acid, 3 to 4% total phosphoric acid.

Uses: Fertilizer.

Railroad shipping regulations: None.*

Milori Blue. See Iron blues.

Mimetesite. See Mimetite.

Mimetite (Mimetesite) $3Pb_3As_2O_8 \cdot PbCl_2$ or $Pb_4(PbCl)(AsO_4)_3$, with some replacement by V, P or Ca.

Natural chloroarsenate of lead. Pale yellow to brown in color with white streak. Resembles pyromorphite (q.v.) very closely, from which it can be distinguished only by chemical tests.

Constants: Sp.gr. 7.0 to 7.25; hardness 3.5.

Occurrence: United States (Arizona, California), England, Germany, southwest Africa.

Mimose. See Wattle.

Mine-ites. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
5-D	A	I a
6-D	B	I a

Railroad shipping regulations: High explosive.

Mine Machine Oil. A non-viscous neutral oil having the same properties as those given under concrete form oil (q.v.) or of black lubricating oil of −15°F. cold test is stated to be suitable for this purpose.

Railroad shipping regulations: None.*

Mineral Black. See under Blacks.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Mineral Blue. See Iron blues.

Mineral Burning Oils. See Burning oils, mineral.

Mineral Butter. See Antimony chloride.

Mineral Carbon. See Graphite.

Mineral Colza Oil.
A mineral burning oil. See Burning oils, mineral.

Mineral Cotton. See Mineral wool.

Mineral Fat. See Petrolatum.

Mineral Glycerol. Liquid petrolatum (q.v.).

Mineral Green. See Copper carbonate.

Mineral Jelly. Petrolatum (q.v.).

Mineral Oil.
A name used for crude petroleum, for the lubricating oils produced from petroleum, and for liquid petrolatum.

Mineral, Orange. See Orange mineral.

Mineral Paint. Minerals used as pigment, including the ochers, iron oxides, barite, etc. See also Ocher, Sienna, Umber. Alabama, Arizona, California, Canada, Connecticut, Florida, Georgia, Indiana, Iowa, Kentucky, Massachusetts, Minnesota, Missouri, New York, Oregon, Pennsylvania, Tennessee, Washington and Wyoming.

Mineral Pitch. See Asphalt.

Mineral Pulp. See Agalite.

Mineral Rouge. See Rouge.

Mineral Rubber.
(a) A term applied to asphaltites such as gilsonite (q.v.) and grahamite (q.v.). (b) Blown asphalts (q.v.). These compounds are known in the trade by the designation "MR."
Uses: Rubber compounding; flux for asphaltites; ingredient of protective coatings; paints.

Mineral Seal Oil. A mineral burning oil. See Burning oils, mineral.

Mineral Sperm Oil. A mineral burning oil. See Burning oils, mineral.

Mineral Superphosphate. See Superphosphate.

Mineral Syrup. Liquid paraffin (q.v.).

Mineral Tallow. A bitumen (q.v.).

Mineral Turpentine. See Turpentine substitutes.

Mineral Wax. See Ozokerite and Ceresin.

Mineral Wool (Mineral cotton; Silicate cotton).
Consists either of slag wool or rock wool:
Slag wool. An intermingled mass of grayish-yellow filaments obtained by blowing steam or hot air through molten slag. It is a poor conductor of heat and sound and is fire and insect proof.
Uses: Packing; insulation; filtering medium; asbestos substitute; fireproofing; building materials. See also Slag.
Rock wool. A product consisting of a fibrous mass, made from an argillaceous limestone quarried in the neighborhood of Alexandria, Indiana.
Efficiency: The United States Bureau of Standards lists rock wool as the most efficient fire-proof chemically stable insulator known today. The coefficient of conductivity is listed at 0.27 B.t.u.'s per square foot at 80° F. This high efficiency is explained by the fact that rock wool contains approximately 90% of its volume in dead air spaces; the coefficient of the dead air spaces is listed at 0.175 B.t.u.'s. The specific heat of rock wool is therefore practically negligible; consequently, the combination of the low specific heat of the fibers and the high efficiency of the dead air spaces give rock wool a twofold advantage.
Forms: Cork (block and granular); brick; cement; felt.
(a) "Banroc." Trade name for a rock wool made by blowing steam through the limestone, the final product being a silicate of the various elements.
(b) "Gimco." Trade name for a rock wool in which the silica is separated from the other elements during the process of manufacture leaving the finished product a pure silica fiber chemically stable and permanent.
Uses: Cold storage insulation; insulating boilers, lehrs, ovens, furnaces, etc.; as felt can be used for insulating layer between metal fabrics.

Miners' Friends. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
1	B	I a
2	B	I a
4, L.F.	B	I a
5, L.F.	B	I a
6, L.F.	B	I a

Railroad shipping regulations: High explosive.

Miners' Oil.
A mineral burning oil compounded with either cottonseed oil or refined white fish oil is stated to make a satisfactory miners' oil. See also Safety lamp gasoline and Safety lamp oil.

Minium. Natural red oxide of lead, $2PbO.PbO_2$. Contains 90.6% lead. Found in Colorado.
See also Lead oxide, red.

Minium, Iron. Ferric oxide, red (q.v.).

Minjak Tangkawang. See Borneo tallow.

Mirabilite $Na_2SO_4.10H_2O$.
A natural hydrated sodium sulfate corresponding to the crystallized sulfate sold commercially as Glauber's salt. White or faintly greenish color, vitreous luster. Contains 19.3% Na_2O, 24.8% SO_3, balance water.
Constants: Sp.gr. 1.48; hardness 1.5 to 2.
Occurrence: United States (Indiana, Utah), Russia, Spain, Sicily, Chile, England, Italy.
Uses: See Glauber's salt.

Mirbane Essence. See Nitrobenzene.

Mirbane Oil. See Nitrobenzene.

"Misch-Metall." The mixture of cerium metals obtained from monazite sand, used for manufacturing ferrocerium, etc.

Misco C. A ferrous alloy which contains, in addition to iron, 28 to 30% chromium, 8 to 10% nickel, 1.5% silicon, 0.5 to 0.7% carbon, 0.4 to 0.5% manganese.

Misco, Standard. A ferrous alloy which contains, in addition to iron, 35 to 37% nickel, 15 to 17% chromium, 1.4 to 1.6% silicon, 0.6 to 0.8% manganese, 0.5 to 0.7% carbon.

Mispickel. See Arsenopyrite.

Mitchella (Squaw vine; Winter clover).
Dried plant of Mitchella repens.
Habitat: North America, particularly New Hampshire.
Grades: N.F.
Uses: Medicine (diuretic, tonic and alterative).

Mitigated Caustic. See Caustic, mitigated.

Mitis Green. See Copper acetoarsenite.

Mixed Acid. Any mixture of sulfuric and nitric acids used for nitrating, e.g., in the manufacture of explosives, plastics, etc. Standard mixed acid consists of 36% nitric and 61% sulfuric acid.

Mizzonite.
A complex natural silicate of calcium and aluminum which also contains some soda and chlorine. It is closely related to wernerite (q.v.). It is intermediate between meionite and marial-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

ite and corresponds to a molecular combination in the ratio, Me: Ma from 3:1 to 1:2. Silica ranges from 54 to 60%.

Occurrence: United States (Connecticut), Canada, Italy, Spain, Norway.

Mocaya Oil. An oil obtained from the kernels of Acrocomia scelerocarpa found in the West Indies and South America.

Modified Sodas. See Sodas, modified.

Moellen Degras. See Degras, moellon.

Mogador Gum. See Arabic gum.

Mohr's Salt. See Ferrous-ammonium sulfate.

Molasses.

The definition of molasses varies in different countries, and in the United States it is not the same in the cane sugar industry as in the beet sugar industry.

In the raw cane sugar industry in the United States molasses is defined as the syrupy mother liquor which is left after sucrose has been removed from sugar-cane juice by concentration, crystallization, and separation of the sugar crystals (usually in centrifugals). If only one crop of crystals has been removed the mother liquor is termed "first molasses"; if a second crop has been removed after reconcentration of the first mother liquor, the resulting product is termed "second molasses," and so on. The final mother liquor from which no more sugar can be extracted in factory practice by the above process is termed "final molasses," "blackstrap molasses," or briefly "blackstrap."

The final mother liquor obtained in cane sugar refineries is not termed molasses, but "refiner's syrup," or "barrel syrup."

In the United States beet sugar industry only the final mother liquor, obtained after concentration, crystallization, and centrifugation of beet juice is termed "molasses." If the Steffen process of desugarization is practiced, the final mother liquor is known as "Steffen molasses."

There are large variations in the composition of different kinds of molasses or final mother liquors. Typical analyses, in round figures, are about as follows.

	Cane Blackstrap	Beet Molasses	Barrel Syrup
		Per Cent	
Sucrose	30	50	35
Reducing sugars.	20	trace	25
Ash	10	10	6
Organic non-sugars	20	20	14
Water	20	20	20

Railroad shipping regulations: None.*

Molasses, Beet. See Molasses.

Molasses, Lactose. Molasses obtained from the preparation of milk sugar.

Mollin.

Derivation: A potash soap from coco-nut oil, containing about 17% of uncombined fatty acids with glycerol.

Color and properties: Yellowish-white, smooth, soft, ointment-like mass; does not become rancid.

Soluble in water.

Grades: Technical.

Containers: Tins; wooden kegs.

Uses: Ointment base.

Railroad shipping regulations: None.*

Molucca Grains. See Tiglium.

Molybdenite (Molybdenum glance) MoS_2.

Bluish lead-gray mineral. Found embedded in or disseminated through granite, gneiss, zirconsyenite, limestone and other crystalline rocks. Resembles graphite in softness and structure but can be distinguished from it by density, streak, blow-pipe reactions and bluer trace on paper. Contains 60.0% molybdenum, 40.0% sulfur. Soluble in sulfuric and strong nitric acids.

Constants: Sp.gr. 4.6 to 4.9; hardness 1 to 1.5.

Occurrence: United States (New Hampshire, Nevada, Montana, Maine, Washington, Utah, Texas, Colorado), Germany, Norway, Australia, Canada.

Uses: Principal source of molybdenum and its compounds.

Molybdenum Mo.

Color and properties: Gray metal or black powder; of wide but not abundant distribution. See Molybdenite and Wulfenite.

Constants: Sp.gr. 8.56.

Soluble in acids; insoluble in water.

Derivation: By aluminothermic or electric furnace reduction of molybdic anhydride.

Forms available: Rods, wire, powder; concentrates.

Purity: Rods and wire 99.9%; powder 95%.

Containers: Wooden barrels.

Uses: Metallurgy (alloy steels); molybdenum compounds; as wire (windings for electrical resistance furnaces, construction of spider which supports tungsten filaments in some incandescent lamps, welded to pyrex glass in construction of plate standards, grids and filament supports in radiotrons); as sheet in manufacture of some types of radiotrons; substitute for platinum in contact-making and breaking devices; points for spark plugs; certain parts of X-ray tubes and Roentgen-ray equipment.

Railroad shipping regulations: None.*

Molybdenum Anhydride. See Molybdic acid.

Molybdenum, Ferro-. See Ferromolybdenum.

Molybdenum Glance. See Molybdenite.

Molybdenum Trioxide. See Molybdic acid.

Molybdic Acid (Molybdenum anhydride; Molybdenum trioxide) H_2MoO_4.

Color and properties: White powder (sometimes slightly yellowish).

Constants: Sp.gr. 3.1124.

Slightly soluble in water (soluble in alkaline solutions).

Derivation: Molybdenite (molybdenum sulfide) is roasted, the trioxide being formed. By the interaction of ammonium hydroxide and the trioxide, ammonium molybdate is formed which is dissociated by sulfuric acid.

Impurities: Ammonium salts, molybdenum oxide, phosphates, tungstates, arsenates and nitric acid.

Grades: Technical; pure, strength about 85%; C.P., about 99.5%.

Containers: ¼, 1 lb. bottles; 25 lb. boxes; 50, 100 lb. kegs.

Uses: Chemicals (molybdenum salts, catalyst); medicine; analytical chemistry; manufacture of metallic molybdenum; electrocoloration of metals; ceramic glazes; lamp filaments; oil and water paint pigment.

Railroad shipping regulations: None.*

Molybdic Ocher. See Molybdite.

Molybdite (Molybdic ocher; Iron molybdate; Ferric molybdate) (a)MoO_3 (b) $Fe_2O_3.3MoO_3.7H_2O$.

Pale yellow mineral usually found as earthy or powdery incrustations or crystallized as tufts of short silky fibers, dull or silky luster. Formerly was considered a natural trioxide of molybdenum corresponding to formula (a) with iron as an impurity. It is now claimed to be a hydrous ferric molybdate corresponding to formula (b). Ferrimolybdite has been suggested as an appropriate name.

Constants: Sp.gr. 4.49 to 4.5; hardness 1 to 2.

Occurrence: United States (California, Georgia).

Monarda Oil. See Horsemint oil.

Monazite (Cryptolite; Edwarsite; Eremite; Mengite; Turnerite).

A natural phosphate of the cerium metals and

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

other rare earth metals, including thorium. Some varieties carry no thorium, but others carry as much as 18% thorium oxide. Color, hyacinth-red, clove-brown, reddish- or yellowish-brown. Subtransparent to subtranslucent. Luster, inclining to resinous.
Constants: Sp.gr. 4.9 to 5.3, mostly 5.0 to 5.2; hardness 5 to 5.5.
Occurrence: United States (Colorado, Connecticut, Idaho, Montana, Nevada, New Mexico, North Carolina, Oregon, South Carolina, Utah, Virginia, Washington, Wyoming), Brazil, Malay States, Ceylon, Nigeria.
Uses: The source of thorium for the incandescent gas mantle industry, and of cerium for the production of pyrophoric alloys.

Mond Gas. A combustible gas composed of a mixture of carbon monoxide, hydrogen and nitrogen. It is formed by passing air and steam over heated coal or peat.
Railroad shipping regulations: Not shipped.

Monel Metal. A non-ferrous alloy containing 60 to 70% nickel, 25 to 35% copper, 1 to 3% iron, 0.25 to 2% manganese, 0.02 to 1.5% silicon, 0.5 to 0.3% carbon. The corrosion rate depends upon conditions and type of apparatus, but the alloy is extensively used in processes where sulfuric, hydrochloric and acetic acids are employed. It is generally used with sodium and ammonium hydroxides where its special properties are of advantage. It is widely used with sea water but must be used only with caution in moist sulfurous atmospheres and with mine waters.

Monesia (Buranhem; Guaranham).
Derivation: Bark of Chrysophyllum glyciphloeum.
Habitat: Brazil.
Grades: Technical.
Containers: Bales.
Uses: Medicine.
Railroad shipping regulations: None.*

Monk's-hood. See Aconite.

Mono Acid F. See 2-Naphthol-7-sulfonic acid.

Mono Compounds. See under specific compounds; e.g. Monoacetin. See Acetin.

Monobels. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
1, L.F.	A	I a
2, L.F.	A	I a
4, L.F.	A	I a
5, L.F.	A	I a
6, L.F.	A	I a
8, L.F.	A	I a
9, L.F.	A	I a
10, L.F.	B	I a
11, L.F.	A	I a

Railroad shipping regulations: High explosive.

Monocalcium Ortho-phosphate. See Calcium phosphate, monobasic.

Monocalcium Phosphate. See Calcium phosphate, monobasic.

Monochlorinated Dutch Liquid. See Ethylene chlorochloride.

Monopole Oil. A trade name for turkey red oil (q.v.).

Monosodium Ortho-phosphate. See Sodium phosphate, monobasic.

Monosodium Phosphate. See Sodium phosphate, monobasic.

Monosulfonic Acid F. See 2-Naphthol-7-sulfonic acid.

Monsel's Salt. See Ferric sulfate, basic.

Monsel's Solution. See Ferric sulfate, basic.

Montan Wax.
Color and properties: White, semi-soft wax; crude product, dark brown.
Soluble in carbon tetrachloride, benzene and chloroform.
Derivation: By extraction of lignites from Saxony and Thuringia.
Method of purification: Distillation with superheated steam.
Grades: Crude; refined.
Containers: Bags.
Uses: Substitute for carnauba and beeswax; increasing hardness of wax compositions; shoe polishes; furniture polishes; phonograph records; roofing paints; rendering paints waterproof; adhesive pastes; candles; hardener for fat compositions; electrical insulating compositions; paper-sizing compositions.
Railroad shipping regulations: None.*

Monticellite. See Olivine.

Montpellier Yellow. See Turner's yellow.

Montroydite. Natural oxide of mercury, HgO. Found in Texas.

Moonstone. A gem stone which is a variety of orthoclase or albite or intermediary mixtures. See Feldspar.
Occurrence: United States (California, Virginia, Pennsylvania), Ceylon, Switzerland, Brazil, Australia, Canada.

Mordanting Assistants. Chemicals such as lactic, oxalic and sulfuric acids, tartar, etc., used in conjunction with mordants to bring about a gradual decomposition of the latter, and to assist in producing a uniform deposition of the actual mordant upon and within textile materials.

Mordant Rouge (Red liquor). A solution of aluminum acetate in acetic acid used in dyeing and calico printing. It is made by dissolving aluminum hydroxide in acetic acid, or by decomposing lead or calcium acetates with aluminum sulfate or alum. Calcium acetate yields the best red liquor; that made from lead acetate is not entirely free from lead, which dulls the shade of delicate colors. It contains sulfate of the alkali metal when made from alum and decomposes more readily than when made from aluminum sulfate. See also Aluminum acetate.

Mordants.
Substances capable of uniting with certain dyes to form insoluble colored compounds which, under the proper conditions, may be more or less permanently fixed upon textile materials. They may be subdivided as follows:

Metallic mordants: Usually metallic oxides or hydroxides which are capable of uniting with certain dyes, known as mordant dyes, to form insoluble colored compounds which, for the most part, are known as color lakes.

Non-metallic mordants: Sulfur is the only mordant of this class which is of any importance and even sulfur is only of minor importance. It is sometimes used when applying certain basic colors, e.g., malachite green upon wool.

Acid mordants: Tannic acid and various substances rich in this acid, such as sumac, gall nuts, various bark extracts, and less frequently various fatty acids, such as oleic and stearic acids, and Turkey red oil, are the only acid mordants of importance. Of these acid mordants, tannic acid and its related compounds are the only ones commonly used, and these chiefly in the application of the basic colors to cotton material.

Mordants, Oil. See Turkey red oil, Gallipoli oil, fatty acids, etc.

Morganite. See Beryl.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Morin $C_{15}H_{10}O_7 . 2H_2O$.
Color and properties: Colorless needles. One of the two coloring principles of old fustic (q.v.).
Soluble in boiling alcohol, alkaline solutions; less soluble in water than maclurin (q.v.).
Derivation: By precipitation from an extract of old fustic.
Railroad shipping regulations: None.*

Morphine $C_{17}H_{19}NO_3 . H_2O$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 254°C.
Slightly soluble in water, alcohol and ether.
Derivation: From opium by extraction and crystallization.
Method of purification: Recrystallization.
Grades: U.S.P.
Containers: ⅛, 1 oz. bottles; 5 oz. tins.
Uses: Medicine (in form of acetate, hydrochloride, U.S.P., sulfate, U.S.P., tartrate, and other soluble salts, as narcotic and sedative).
Railroad shipping regulations: None.*

Morphine Acetate $C_{17}H_{19}NO_3C_2H_4O_2 . 3H_2O$.
Color and properties: White, crystalline or amorphous powder; poisonous!
Constants: M.p. 200°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: By heating morphine and acetic acid in presence of sulfuric acid.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: ⅛, 1 oz. bottles; 5 oz. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Morphine Benzylether Hydrochloride. See Peronine.

Morphine Bimeconate. See Morphine meconate.

Morphine Hydrochloride (Morphine muriate) $C_{17}H_{19}NO_3HCl . 3H_2O$.
Color and properties: Microcrystalline needles; poisonous!
Constants: M.p. 250°C.
Soluble in water and alcohol; insoluble in ether.
Derivation: By the action of hydrochloric acid on morphine.
Method of purification: Crystallization.
Grades: U.S.P. (cubes, flakes, powder).
Containers: ⅛, 1 oz. bottles; 5 oz. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Morphine Meconate (Morphine bimeconate) $(C_{17}H_{19}NO_3)_2C_7H_4O_7 . 5H_2O$.
Color and properties: Yellowish-white, crystalline powder; poisonous!
Soluble in water and alcohol.
Derivation: From opium by extraction.
Method of purification: Crystallization
Grades: Technical.
Containers: ⅛, 1 oz. bottles; 5 oz. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Morphine Methyl Bromide. See Morphosan.

Morphine Muriate. See Morphine hydrochloride.

Morphine Nitrate $C_{17}H_{19}NO_3 . HNO_3$.
Color and properties: White powder; darkens when exposed to light; poisonous!
Soluble in water.
Derivation: By the action of nitric acid on morphine.
Method of purification: Crystallization.
Grades: Technical.
Containers: ⅛, 1 oz. bottles; 5 oz. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Morphine, Para-. See Thebaine.

Morphine Sulfate $(C_{17}H_{19}NO_3)_2 . H_2SO_4 . 5H_2O$.
Color and properties: Acicular crystals or cubical masses; poisonous!
Constants: M.p. 250°C.
Soluble in water; slightly soluble in alcohol; insoluble in ether.
Derivation: By the action of sulfuric acid on morphine.
Method of purification: Crystallization.
Grades: U.S.P. (crystals, cubes, flakes, powder).
Containers: ⅛, 1 oz. bottles; 5 oz. tins; cubes in 1 oz. bottles only.
Uses: Medicine.
Railroad shipping regulations: None.*

Morphosan (Morphine methyl bromide) $C_{17}H_{19}O_3NBrCH_3$.
Color and properties: Needles; does not produce disagreeable after effects of morphine.
Soluble in water.
Uses: Medicine (substitute for morphine in treatment of morphine habit, unofficial).
Railroad shipping regulations: None.*

Morocco Gum. See Arabic gum.

Morrha Oil. See Cod-liver oil.

Mosaic Gold. See Stannic sulfide.

Moschus, U.S.P. See Musk.

Mosoi Flower Oil. See Ylang ylang oil.

Moss Green. See Copper acetoarsenite.

Mossbunker Oil. See Menhaden oil.

Mother of Coal. A term sometimes used to designate charcoal.

Motor Spirit. See Gasoline.

Mottramite $(CuPb)_5V_2O_{10} . 2H_2O$.
Unimportant mineral. Found as thin blackish-green incrustations with yellow streak upon Keuper sandstone in Cheshire, England.

Mountain Balm. See Eriodictyon.

Mountain Blue (Copper blue).
Derivation: The mineral azurite, in ground form.
Grades: Technical.
Containers: Kegs; boxes.
Uses: Paint pigment.
Railroad shipping regulations: None.*

Mountain Brown Ore. A local name for limonite or brown iron ore. Applied in Virginia to the low-grade, siliceous variety, which commonly occurs in hard lumps and which is found on the mountain slopes at or near the contact of the Cambrian shale and sandstone with the Cambro-Ordovician limestone. See Valley brown ore Virginia.

Mountain Damson. See Simaruba bark.

Mountain Green (Mineral green).
The mineral malachite (q.v.) in ground form.

Mountain Leather. Thin, tough varieties of asbestos (q.v.).

Mountain Paper. Thin, tough varieties of asbestos (q.v.).

Mountain Tobacco. See Arnica flowers.

Mousse de Chêne. See Oakmoss resin.

Mowra Oil.
Color and properties: Yellow, semi-liquid fat; bitter, aromatic taste; characteristic odor similar to that of cacao beans.
Soluble in ether, chloroform, benzine and carbon bisulfide.
Constants: Sp.gr. 0.894 to 0.898; m.p. 23° to 29°C.; saponification value 188 to 194; iodine value 58 to 67.
Derivation: From the seeds of Bassia latifolia.
Habitat: India (Northern Provinces).
Grades: Crude; refined.
Containers: Wooden barrels.
Uses: Soaps.
Railroad shipping regulations: None.*

Mucic Acid (Saccharolactic acid) $(OH)_4C_4H_4(COOH)_2$.
Color and properties: White, crystalline powder.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: M.p. 213°C.
Soluble in water; insoluble in alcohol.
Derivation: By the oxidation of lactose with nitric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Mucilage Oil. A decoction of linseed, foenugreek seeds, and marshmallow root boiled with olive oil.

Muguet, Synthetic. See Hydroxycitronellal.

Muller's Glass. See under Opal, Hyalite.

Mullite.
A refractory of recent origin. It is an aluminum silicate formed by calcining the minerals, dumorticrite, cyanite, or andalusite at high temperature. Mullite bodies are highly refractory and show excellent resistance to deformation under load and to spalling. They also show a uniform rate of thermal expansion.
Uses: Refractory brick, saggers, tank blocks, pyrometer tubes.

Mundic. See Pyrrhotite.

Mungo. Another term for shoddy.

Muriates. See chlorides or hydrochlorides of the respective metals, bases, alkaloids, etc.

Muriatic Acid. See Hydrochloric acid.

Muriatic Ether. See Ethyl chloride.

Murillo Bark. See Quillaja.

Muromontite. See Allanite.

Muscle Fibrin. See Syntonin.

Muscovite. See Mica.

Musk (Moschus, U.S.P.).
Color and properties: An unctuous brownish semi-liquid when fresh; dried, in grains or lumps with color resembling dried blood.
Derivation: Secretion from preputial follicles of the musk deer, Moschus moschiferus.
Habitat: Northern Asia, Tonquin and Thibet.
Grades: Tonquin, Cabardine, Yeman, Assam or Nepaul.
Containers: Metal boxes.
Uses: Medicine; perfumery; flavoring sweetmeats; toilet soaps; mothproofing agent.
Railroad shipping regulations: None.*

Musk-root. See Sumbul.

Musk, Synthetic. A number of compounds are so called; these are usually nitrated tertiary butyl toluenes or xylenes or related compounds. Three commonly used in perfumery are musk ambrette (dinitrobutylmetacresolmethylether), musk ketone (dinitrobutylmetaxylene), and musk xylene (trinitro-tertiary-butylxylene).

Mustard. See Sinapis nigra and S. alba.

Mustard Gas. See Dichlorodiethyl sulfide.

Mustard Oil, Artificial. See Allyl mustard oil.

Mustard Oil, Volatile (Black mustard oil; Oleum sinapis).
Color and properties: Colorless to pale yellow limpid liquid slowly changing to reddish-brown on exposure to light. Pungent, acrid odor and taste.
Chief known constituents: Allylisothiocyanate, carbon bisulfide, allyl cyanide.
Constants: Sp.gr. 1.016 to 1.022 (rarely 1.030); refractive index 1.52681 to 1.52804; b.p. 148° to 154°C. (760 mm.).
Solubility in alcohol: In 7 to 10 vols. of 70% alcohol; in 2.5 to 3 vols. of 80% alcohol; clear solutions in all proportions with 90% alcohol.
Derivation: From the seeds of Sinapis nigra, L., and Sinapis juncea, L. These are ground, rendered free of their fatty oil content by hydraulic pressure, mixed with warm water, allowed to ferment and then distilled.
Uses: Medicine.
Railroad shipping regulations: None.*

Mustard Oil, Black. See Mustard oil, volatile.

Muthmann's Liquid. See Acetylene tetrabromide.

Myrabane Oil. See Nitrobenzene.

Myrcia Oil. See Bay oil.

Myrica (Candleberry; Bayberry; Wax myrtle; Wax berry; Tallow shrub).
Bark of Myrica cerifera or carolinensis.
Habitat: Maryland to Florida, west to Texas and Arkansas.
Grades: Technical; N.F.
Containers: Bales.
Uses: Medicine (stimulant and astringent); source of bayberry wax.
Railroad shipping regulations: None.*

Myristica (Nutmeg; Nux moschata; Nuces nucistae).
Kernel of the ripe seed of Myristica fragrans.
Habitat: Southern Asia and Moluccas; cultivated in many tropical countries.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine; condiment; damaged seeds used as source of nutmeg oil.
Railroad shipping regulations: None.*

Myristica Kino.
Color and properties: Small or large angular pieces. Deep garnet color. Has general characteristics of Malabar kino (q.v.).
Derivation: From Myristica malabarica, of M. fragrans, and probably other species of the genus.
Uses: Similar to Malabar kino (q.v.).
Railroad shipping regulations: None.*

Myristica Oil. See Nutmeg oil.

Myrobalans (Terminala chebula; Hurr nuts).
Derivation: The dried fruit of certain Indian and Chinese trees, Myrobalanus chebula. They appear in commerce as dried and shrivelled nuts about an inch long, containing 30% tannin.
Grades: Solid, 50% tannin. Extract, 25% tannin.
Containers: Dry: 50, 100 lb. boxes. Extract: 450-500 lb. wooden barrels.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Myrrh Gum (Herrabol myrrh).
The gum-resin of Commiphora myrrha or other species of myrrh.
Habitat: Nubia, Somaliland and Arabia.
Partially soluble in water, alcohol and ether.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Dentifrices; perfumery.
Railroad shipping regulations: None.*

Myrrh Oil.
Color and properties: Yellowish, rather viscid liquid; strong odor.
Chief constituents: Cuminic aldehyde, eugenol, meta-cresol, pinene and dipentene.
Constants: Sp.gr. 0.988 to 1.007; b.p. 220° to 235°C.
Soluble in alcohol and ether.
Derivation: Distilled from the gum-resin, myrrh.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Copper flasks; glass bottles.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Myrrh, Sweet. See Bissabol.

Myrtle Oil, Spanish.
Color and properties: Light, yellow liquid; agreeable aromatic odor.
Chief known constituents: Cineole, borneol, dextropinene, dipentene.
Constants: Sp.gr. 0.89 to 0.92; optical rotation +10° to +30°.
Soluble in alcohol and ether.
Derivation: Distilled from the leaves of Myrtus communis.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Medicine; perfumery (fixative).
Railroad shipping regulations: None.*

Myrtle Wax. See Bayberry wax.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

N

N. W. Acid. Nevile and Winther's acid. See 1-Naphthol-4-sulfonic acid.

Naftalan. See Naphthalan.

Nagyagite $(Pb,Au)_2(Te,Sb,S)_3$ or $Au_2Pb_{14}Sb_3Te_7S_{17}$ or $AuPb_6Te_6S_8$.
A variety of the gold telluride group of minerals for which no definite formula has been agreed upon. Contains 5.84 to 12.75% Au, 50.78 to 60.83% Pb, 15.11 to 30.52% Te. Blackish lead-gray color, bright metallic luster.
Constants: Sp.gr. 6.85 to 7.46; hardness 1 to 1.5.
Occurrence: United States (Colorado), Transylvania, New Zealand.

Nankin Yellow. See Iron buff.

Naphtha. See Petroleum.

Naphtha, Heavy (Crude heavy solvent naphtha).
Color and properties: Deep amber to dark red liquid; a mixture of xylene and higher homologs; inflammable.
Constants: Sp.gr. 0.925 to 0.950; b.p. 160° to 220°C. (about 90% at 200°C.); flash-point: about 78.3°C.; evaporation 303 minutes.
Derivation: (a) From coal-tar by fractional distillation. (b) From illuminating gas by scrubbing and distilling the resulting oil.
Grades: Technical.
Containers: Drums; tank-cars.
Uses: Para-coumarone resins; solvent for dark-colored paints and enamels; solvent for asphalts, road tars, pitches, etc.; in saturating asbestos-board, brake-linings and the like; cleansing compositions; illuminant; process engraving and lithography; rubber cements (solvent); naphtha soaps.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Naphtha, High Flash ("Hi-Flash" naphtha).
Color and properties: Water-white, volatile, mobile, inflammable liquid.
Constants: Sp.gr. 0.870 to 0.880; b.p. 150° to 200°C.; flash-point: Not below 37.8°C.; evaporation 205 minutes.
Derivation: A solvent naphtha, from coal-tar or illuminating gas.
Grades: Water-white.
Containers: Iron drums; tank cars.
Uses: Solvent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label(?)*

Naphtha, Petroleum. See Petroleum ether.

Naphtha, Solvent (160° Benzol; Coal-tar naphtha).
Color and properties: A mixture of small quantities of benzene and toluene with xylene and higher homologs, from coal-tar. (a) Crude: Dark straw-colored liquid; inflammable. (b) Refined: Water-white liquid; inflammable.

Constants:	(a)	(b)
Specific gravity	0.862-0.892	0.862-0.872
Boiling-point	About 160°C. (80%)	About 160°C. (90%)
Flash-point	About 25.6°C.	About 25.6°C.

Evaporation 200 on metal surface 3½" square: (a) 107 minutes; (b) 121 minutes
Derivation: (a) From coal-tar by fractional distillation. (b) From illuminating gas by scrubbing and distilling the resulting oil.
Grades: Dark straw; water-white.
Containers: 55, 110 gal. iron drums; 8,000 gal. tank cars.
Uses: Solvent; xylene; cumene; nitrated solvent naphtha for incorporation in dynamite compositions.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Naphtha, Solvent, Crude Heavy. See Naphtha, heavy.

Naphthalan (Naftalan).
Color and properties: Soft greenish-black mass, somewhat empyreumatic odor.
Constants: Sp.gr. 0.89; m.p. 70°C.
Soluble in ether and petroleum benzine; insoluble in water and glycerol; miscible with fats and oils.
Derivation: By fractional distillation of Armenian naphtha.
Uses: Medicine (used as a 50% paste in treatment of pruritus, burns, chronic eczema, sycosis, other parasitic skin diseases, unofficial).
Railroad shipping regulations: None.*

Naphthalene (Tar Camphor; Naphthalin; White tar) $C_{10}H_8$.
Color and properties: White, crystalline, volatile flakes; strong coal-tar odor.
Constants: Sp.gr. 1.145; m.p. 80.05°C.; b.p. 217.96°C.
Soluble in benzene, absolute alcohol and ether; insoluble in water.
Derivation: (a) From the coal-tar oils boiling between 170° and 230°C., by cooling the oils in large tanks. (b) From illuminating gas mains, as such.
Method of purification: The crude crystals are purified by hydraulic pressing or by centrifuging and by treatment with sulfuric acid followed by sublimation.
Impurities: Coal-tar oils.
Grades: Flakes; balls; blocks; cubes; grains (rice); powder crushed; tablets; crude; C.P.; U.S.P.
Containers: 1 lb. bottles; 1 lb. cans; 175, 250 lb. barrels; crude: 200 lb. bags.
Uses: Chemicals (hydrogenated naphthalenes, tetralin, decalin); dyes (phthalein dyes, synthetic indigo); intermediates; moth repellant; insecticide; constituent of composite motor fuels; explosives; anthracite briquette binder; gas enrichener in lamps of albo-carbon type; disinfectant; celluloid (camphor substitute); solvent for resins; manufacture of synthetic resins by condensation with formaldehyde; rubber (solvent, preservative packing); removing efflorescence in petroleum oils and distillation products; paraffin substitute; candles; synthetic tannins; preserving hides; wood-preservative compounds; lubricating compounds; asphalt solvent; ingredient of fatty lacquers and varnishes made from rosin.
Railroad shipping regulations: None.*

Naphthalene Diamine. See Diaminonaphthalene.

Naphthalene-1:5-disulfonic Acid (Armstrong's acid) $C_{10}H_8O_6S_2$.
Color and properties: White crystalline solid.
Soluble in water.
Derivation: Sulfonation of naphthalene with

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

oleum at low temperature and separation from the 1:6 isomer.
Method of purification: Recrystallization from water.
Grades: Technical.
Containers: Oak barrels.
Uses: Intermediate for dyes.
Railroad shipping regulations: None.*

Naphthalene-2:7-disulfonic Acid $C_{10}H_8O_6S_2$.
Color and properties: White crystalline solid.
Soluble in water.
Derivation: Sulfonation of naphthalene at high temperature and separation from 2:6 isomer.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Oak barrels.
Uses: Intermediate for dyes.
Railroad shipping regulations: None.*

Naphthalene Grease. 100 parts of crude naphthalene to 50 to 100 parts of colza oil.
Railroad shipping regulations: None.*

Naphthalenesulfonic Acid, Alpha- $C_{10}H_7SO_3H.H_2O$.
Color and properties: Deliquescent crystals.
Constants: M.p. 85°C. to 90°C.
Soluble in water, alcohol and ether.
Derivation: By the interaction of naphthalene and sulfuric acid.
Method of purification: Crystallization.
Containers: Wooden barrels; kegs.
Grades: Technical.
Uses: Starting point in the manufacture of alpha-naphthol, alpha-naphthol sulfonic acid, alpha-naphthylamine sulfonic acid; solvent (sodium salt) for phenol in the manufacture of disinfectant soaps.
Railroad shipping regulations: None.*

Naphthalenesulfonic Acid, Beta- $C_{10}H_7SO_3H$.
Color and properties: Non-deliquescent, white plates.
Soluble in water, alcohol and ether.
Derivation: By the sulfonation of naphthalene.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Starting point in the manufacture of beta-naphthol, beta-naphthol sulfonic acid, beta-naphthylamine sulfonic acid; photography (starting point in the manufacture of the developer, paranil A).
Railroad shipping regulations: None.*

Naphthalene, Para-. See Anthracene.

Naphthalic Acid. See Phthalic acid.

1-Naphthalidoanthraquinone-2-carboxylic Acid. $C_{25}H_{15}O_4N$.
Color and properties: Bluish-black in color.
Sparingly soluble in alkalis, nitrobenzene, orthodichlorobenzene, or glacial acetic acid.
Derivation: Prepared by the condensation of 1-chloroanthraquinone-2-carboxylic acid with beta-naphthylamine.
Method of purification: By recrystallization from glacial acetic acid.
Uses: Used as the intermediate for the preparation of Ponsol red BN.
Railroad shipping regulations: None.*

Naphthalin. See Naphthalene.

Naphthalol. See Naphthylsalicylate, beta-.

Naphthaquinoneoxime. See Nitrosonaphthol.

1:8-Naphthasultam-2:4-disulfonic Acid (Sultam acid) $C_{10}H_7NO_8S_3$.
Color and properties: White solid.
Soluble in water; slightly soluble in alcohol.
Derivation: Oleum sulfonation of peri acid or 1-naphthylamine-4:8-disulfonic acid.
Grades: Technical.
Containers: Not sold as such.
Uses: Intermediate for Chicago acid.
Railroad shipping regulations: None.*

Naphthenes. Saturated hydrocarbons, generally derivatives of cyclopentane (C_5H_{10}) or cyclohexane (C_6H_{12}), occurring in mixture in petroleums of various origins. Baku petroleum consists of 80% of naphthenes. Galician petroleums contain considerable amounts.

Naphthionic Acid (1-Aminonaphthalene-4-sulfonic acid; 4-Amino-1-naphthalene sulfonic acid) $C_{10}H_6(NH_2)SO_3H$.
Color and properties: White crystals or powder. Soluble in alcohol and ether.
Derivation: By baking a mixture of equal molecules of alpha-naphthylamine and sulfuric acid, with which about 3% of oxalic acid is incorporated.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Railroad shipping regulations: None.*

Naphthol A S. See Hydroxynaphthoic anilide, beta-.

Naphthol, Alpha- ($C_{16}H_7OH$).
Color and properties: Colorless prisms or powder; disagreeable taste.
Constants: Sp.gr. 1.224; m.p. 94.2°C.; b.p. 278°C.
Soluble in benzene, alcohol and ether; slightly soluble in water.
Derivation: By fusing alpha-naphthalenesulfonate and caustic soda. The melt is decomposed with hydrochloric acid and distilled.
Method of purification: Redistillation.
Impurities: Beta-naphthol.
Grades: Technical; pure.
Containers: 300 lb. wooden barrels; kegs.
Uses: Dyes; organic synthesis.
Railroad shipping regulations: None.*

Naphthol Benzoate Beta-. See Benzonaphthol.

Naphthol, Beta- $C_{10}H_7OH$.
Color and properties: White, lustrous, bulky leaflets, or white powder; darkens with age.
Constants: Sp.gr. 1.217; m.p. 121.6°C.; b.p., 285°C.
Soluble in alcohol, ether, chloroform, glycerol, oils and alkaline solutions; slightly soluble in water.
Derivation: By fusing sodium beta-naphthalenesulfonate with caustic soda. The product is distilled in vacuo.
Method of purification: Sublimation.
Grades: Technical; U.S.P.
Containers: 1 lb. cartons; 250, 300, 350 lb. wooden barrels.
Uses: Medicine (intestinal antiseptic); organic synthesis; dyes.
Railroad shipping regulations: None.*

2-Naphthol-3:6-disulfonic Acid (R acid; Beta-naphthol disulfonic acid) $C_{10}H_5(OH)(SO_3H)_2$.
Color and properties: Deliquescent, colorless, silky needles.
Soluble in water, alcohol and ether.
Derivation: By heating beta-naphthol with sulfuric acid (98%) dissolving the melt in water and adding salt.
Method of purification: Crystallization or through the hard, soluble Ca-Na salt.
Grades: Technical, with varying amounts of Schaeffer's acid.
Containers: Wooden barrels.
Uses: Manufacturing azo dyes for textiles, lakes and foods.
Railroad shipping regulations: None.*

Naphtholdisulfonic Acid, Beta-. See 2-Naphthol-3:6-disulfonic acid.

2-Naphthol-6:8-Disulfonic Acid, Potassium Salt (G salt) $C_{10}H_5OH(SO_3K)_2$
Color and properties: Very small white needles, dry or in paste.
Very soluble in water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Sulfonating beta-naphthol in oleum, diluting in water and salting out with potassium sulfate.
Method of purification: Recrystallization.
Grades: Technical; not more than 1.0% R and Schaeffer salts.
Containers: Wooden barrels.
Uses: Azo dyes for textiles and lakes.
Railroad shipping regulations: None.*

Naphtholmethyl Ether, Beta-. See Naphthylmethyl ether, beta-.

1-Naphthol-4-sulfonic Acid (Nevile and Winther's acid; Alpha-naphtholsulfonic acid) $C_{10}H_8O_4S$.
Color and properties: Transparent plates.
Constants: M.p. 170°C.
Soluble in water.
Derivation: From the sodium salt of naphthionic acid by hydrolyzing the amino group.
Method of purification: Water if any.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

1-Naphthol-5-Sulfonic Acid (Cleve's acid; L acid; Alpha-naphtholsulfonic acid) $C_{10}H_8O_4S$.
Color and properties: White solid.
Soluble in water.
Derivation: (1) From naphthalene-1:5-disulfonic acid by fusion with caustic soda. (2) From 1-naphthylamine-5-sulfonic acid by diazotizing and boiling the diazo solution with dilute sulfuric acid.
Method of purification: Recrystallization from hot water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Naphthol-1-sulfonic Acid (Tobias acid) $C_{10}H_8O_4S$.
Color and properties: White crystalline solid.
Soluble in water.
Derivation: By sulfonating beta-naphthol with 2 to 2.5 parts of 90 to 92% sulfuric acid at about 40°C.
Method of purification: Recrystallization from water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Intermediate for Tobias acid.
Railroad shipping regulations: None.*

2-Naphthol-6-sulfonic Acid (Schaeffer's acid; Beta-naphtholsulfonic acid) $C_{10}H_8O_4S$.
Color and properties: White leaflets.
Constants: M.p. 122°C.
Soluble in water and alcohol.
Derivation: By sulfonation of beta-naphthol and separation from the croceine acid formed simultaneously.
Method of purification: Recrystallization from water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Naphthol-7-sulfonic Acid (Cassella's acid; Monosulfonic acid F; F acid; Mono acid F; Beta-naphtholsulfonic acid) $C_{10}H_6(OH)(SO_3H)$.
Color and properties: White crystals.
Constants: M.p. 89°C.
Soluble in water and alcohol.
Derivation: By fusion of naphthalene-2:7-disulfonic acid with caustic soda or by heating the acid with an aqueous solution of caustic soda in an autoclave.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Naphtholsulfonic Acid, Alpha-. See 1-Naphthol-4-sulfonic acid and 1-Naphthol-5-sulfonic acid.

Naphthoresorcinol. See 1:3-Dihydroxynaphthalene.

Naphthosalol. See Naphthylsalicylate, beta-.

Naphthylamine, Alpha- ($C_{10}H_7NH_2$).
Color and properties: White crystals.
Constants: Sp.gr. 1.223; m.p. 50°C.; b.p. 301°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By the reduction of alpha-nitronaphthalene with iron and hydrochloric acid. The mass is then mixed with milk of lime and distilled.
Method of purification: Crystallization.
Grades: Technical.
Containers: 225, 300, 350 lb. wooden barrels.
Uses: Organic synthesis; dyes.
Railroad shipping regulations: None.*

Naphthylamine, Beta- $C_{10}H_9N$.
Color and properties: White lustrous leaflets.
Constants: Commercial freezing point 109.5°C.
Soluble in hot water, alcohol, ether and benzene.
Derivation: From beta-naphthol by heating in an autoclave with ammonium sulfite and ammonia.
Method of purification: Distillation.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

1-Naphthylamine-3: 8-disulfonic Acid (Epsilon acid) $C_{10}H_9NO_6S_2$.
Color and properties: White crystalline scales.
Soluble in hot water.
Derivation: Naphthalene-1:5- and 1:6-disulfonic acids are nitrated and reduced, resulting in 1-naphthylamine-3:8- and 4:8-disulfonic acids. The separation is effected by crystallizing out the acid sodium salt of 1-naphylamine-3:8-disulfonic acid.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

1-Naphthylamine-4: 8-disulfonic Acid (Schoelkopf's acid; S acid) $C_{10}H_9NO_6S_2$.
Color and properties: White solid.
Derivation: This acid is prepared by sulfonating peri acid with three times its weight of 10% oleum, the two being mixed in the cold and the sulfonation finished at 100°C.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Naphthylamine-4: 8-disulfonic Acid (C acid).
Color and properties: White crystalline solid.
Soluble in water (slightly).
Derivation: Reduction of 2-nitronaphthylamine-4:8-disulfonic acid.
Method of purification: Recrystallization of sodium salt from water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyestuffs.
Railroad shipping regulations: None.*

2-Naphthylamine-5: 7-disulfonic Acid (Amino-J acid) $C_{10}H_9NO_6S_2$.
Color and properties: Crystallizes in white lustrous leaflets from water and in long needles from hydrochloric acid solutions.
Derivation: By sulfonation of either 2-naphthylamine-5-sulfonic acid or beta-naphthylamine or 2-naphthylamine-7-sulfonic acid.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

2-Naphthylamine-6:8-disulfonic Acid (Amino-G acid) $C_{10}H_9NO_6S_2$.
Color and properties: White crystalline solid.
Soluble in water.
Derivation: (a) From G acid by heating of sodium salt with ammonia and sodium bisulfite solution in an autoclave under pressure. (b) Sulfonation of beta-naphthylamine.
Method of purification: Recrystallization from water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Naphthylamine Hydrochloride, Alpha- $C_{10}H_7NH_2 . HCl$.
Color and properties: White to gray, crystalline powder.
Soluble in water, alcohol and ether.
Derivation: By the action of hydrochloric acid on alpha-naphthylamine.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Dyes; organic synthesis.
Railroad shipping regulations: None.*

1-Naphthylamine-4-sulfonic Acid. See Naphthionic acid.

1-Naphthylamine-5-sulfonic Acid (Laurent's acid; L acid) $C_{10}H_9NO_3S$.
Color and properties: Anhydrous, white or pinkish crystalline needles; greenish fluorescence in dilute aqueous solution.
Soluble in water.
Derivation: (a) From alpha-naphthylamine by sulfonation with oleum. (b) From alpha-naphthalene by nitration, reduction and separation from 1-naphthylamine-8-sulfonic acid also formed.
Method of purification: Crystallization.
Grades: Technical (not more than 2% 1:8 acid).
Containers: Wooden barrels.
Uses: Azo dyes.
Railroad shipping regulations: None.*

1-Naphthylamine-6 and 7-sulfonic Acid (Cleve's acid) $C_{10}H_6NH_2SO_3H$.
Color and properties: Colorless needles.
Not very soluble in water.
Derivation: Sulfonation, nitration, reduction and either separation of the combined 1:6 and 1:7 acids or separating by different concentration and salting out.
Method of purification: Recrystallization.
Grades: Technical; either mixture of 1:6 plus 1:7 acids or each separate.
Containers: Wooden barrels.
Uses: Azo and diazo dyes.
Railroad shipping regulations: None.*

1-Naphthylamine-8-sulfonic Acid (Peri acid; S acid; Schoelkopf's acid) $C_{10}H_6NH_2SO_3H$.
Color and properties: White needles.
Very little soluble in water.
Derivation: Together with 1:5-naphthylamine sulfonic acid by sulfonating naphthalene, nitrating, reducing and separating the combined precipitated acids with soda ash. The insoluble 1:8 sodium salt is filtered off from the 1:5 sodium salt solution and transposed into free acid with muriatic acid.
Grades: Technical, with less than 1% 1.5 acid.
Containers: Wooden barrels.
Uses: Mostly as phenyl-1:8-naphthylamine sulfonic acid for azo dyes.
Railroad shipping regulations: None.*

2-Naphthylamine-1-sulfonic Acid (Tobias acid) $C_{10}H_9NO_3S$.
Color and properties: Crystallizes in white needles.
Soluble in hot water.
Derivation: Sodium 2-naphthol-1-sulfonate (from beta-naphthol and sulfuric acid at 40°C.) is heated with ammonium hydrogen sulfite and ammonia in an autoclave at from 100° to 150°C.
Method of purification: Precipitation from dilute solution of sodium salt.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Naphthylamine-5-sulfonic Acid (Dahl's acid). See 2-Naphthylamine-5-and-8-sulfonic acids.

2-Naphthylamine-5-and-8-sulfonic Acids (A mixture of the 2:5 and 2:8 isomers) $C_{10}H_6(NH_2)SO_3H$.
Color and properties: White crystals.
Soluble in alcohol and ether; very slightly soluble in water.
Process of manufacture: By heating together beta-naphthylamine, fuming sulfuric acid (20% SO_3) and the gamma acid (about 70% gamma and 30% alpha).
Derivation: Crystallization.
Grades: Technical.
Containers: Wooden barrels; kegs.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Naphthylamine-6-sulfonic Acid (Broenner's acid; Bronner's acid) $C_{10}H_6(NH_2)SO_3H$.
Color and properties: Colorless needles.
Soluble in boiling water.
Derivation: By heating beta-naphthol beta-sulfonic acid S with aqueous ammonia in an autoclave.
Grades: Technical.
Containers: Barrels and kegs.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Naphthylamine-7-sulfonic Acid (Cassella's acid F; Bayer's acid; F acid; Delta acid) $C_{10}H_6(NH_2)SO_3H$.
Color and properties: Colorless crystals.
Soluble in water, alcohol and ether.
Derivation: (Cassella's acid F.) By heating beta-naphtholsulfonic acid F with aqueous ammonia in an autoclave. (Bayer's acid.) By heating the beta acid together with beta-naphthylamine sulfate with concentrated sulfuric acid.
Grades: Technical.
Containers: Wooden barrels; kegs.
Uses: Dyes.
Railroad shipping regulations: None.*

2-Naphthylamine-8-sulfonic Acid (Badische acid). See 2-Naphthylamine-5-and-8-sulfonic acids.

1-Naphthylamine-3:6:8-trisulfonic Acid (Koch's acid) $C_{10}H_9NO_9S_3$.
Color and properties: White solid.
Soluble in water (slightly).
Derivation: Naphthalene is sulfonated to naphthylamine-1:3:6-trisulfonic acid using oleum; and this trisulfonic acid is nitrated cold and then reduced with iron.
Method of purification: Recrystallization from water.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

1:5-Naphthylenediamine-3:7-disulfonic Acid (4:8-diamino-2:6-naphthalenedisulfonic acid) $C_{10}H_4(NH_2)_2(SO_3H)_2$.
Color and properties: Small crystals.
Soluble in alcohol and ether; insoluble in water.
Derivation: By nitration and reduction of 2:6-naphthalenedisulfonic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis; dyes.
Railroad shipping regulations: None.*

1:8-Naphthylenediamine-3:6-disulfonic Acid (4:5-Diamino-2:7-naphthalenedisulfonic acid) $C_{10}H_4(NH_2)_2(SO_3H)_2$.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Long, thin crystals.
Soluble in water and alcohol.
Derivation: By the nitration and reduction of 2:7-naphthalenedisulfonic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Making H acid.
Railroad shipping regulations: None.*

1:3-Naphthylenediamine-6-sulfonic Acid (5:7-Diamino-2-naphthalenesulfonic acid) $C_{10}H_5(NH_2)_2SO_3H$.
Color and properties: Small crystals.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By heating the alpha-naptholdisulfonic acid with ammonium hydroxide under pressure.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses. Organic synthesis.
Railroad shipping regulations: None.*

1:4-Naphthylenediamine-2-sulfonic Acid (1:4-Diamino-2-naphthalenesulfonic acid) $C_{10}H_5(NH_2)_2SO_3H$.
Color and properties: Small crystals.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: From alpha-naphthylaminesulfonic acid by combination with diazobenzene and subsequent reduction.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis; dyes.
Railroad shipping regulations: None.*

Naphthylethyl Ether, Beta- (Bromelia; Nerolin II) $C_{10}H_7OC_2H_5$.
Color and properties: Colorless crystals.
Constants: M.p. 37°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the interaction of beta-naphthol and ethyl alcohol in presence of sulfuric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Perfumes; soaps.
Railroad shipping regulations: None.*

Naphthylmethyl Ether, Beta- (Nerolin; Yara-yara; Naphtholmethylether, beta-; Methyl-beta-naphtholate) $C_{10}H_7OCH_3$.
Color and properties: White, crystalline scales.
Constants: M.p. 72°C.; b.p. 274°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By heating beta-naphthol and methyl alcohol in presence of sulfuric acid. (b) By methylating beta-naphthol with dimethyl sulfate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Perfumery (soaps).
Railroad shipping regulations: None.*

Naphthylsalicylate, Alpha-. See Alphol.

Naphthylsalicylate, Beta- (Betol: Naphthosalol; Naphthalol; Salinaphthol; Salicylicnaphthyl ester) $C_6H_4OHCOO(C_{10}H_7)$.
Color and properties: White, shining crystals, odorless, tasteless; decomposed by the alkaline pancreatic fluid; undecomposed by cold acids or alkalis.
Constants: M.p. 95°C.
Soluble in hot alcohol, ether, benzene; soluble with difficulty in cold alcohol; insoluble in water.
Derivation: By the action of salicylic acid on beta-naphthol.
Uses: Medicine (substitute for salol, antirheumatic, ammoniacal cystitis, unofficial).
Railroad shipping regulations: None.*

Naples Yellow. See Lead antimonate.

Napus (Rape).
Derivation: Flowers and seeds of Brassica napus.
Habitat: Europe.
Grades: Technical.
Containers: Bags.
Uses: Source of rape-seed oil.
Railroad shipping regulations: None.*

Narceine $C_{23}H_{27}O_8N.3H_2O$.
Color and properties: White, silky crystals, bitter taste, odorless. Crystallizes from water at 60°C. with 2 mols of water, loses these at 100°C. and a further mol at 140°C. The fused residue is a mixture of bases.
Constants: M.p. 150° to 160°C. (commercial), 170° to 171°C. (pure base).
Soluble in alcohol and boiling water; less soluble in cold water; insoluble in ether.
Uses: Medicine (mild narcotic).
Railroad shipping regulations: None.*

Narcodeon. Double salts of narcotine and codeine with di- and polybasic acids used in medicine as a substitute for morphine. Unofficial.
Railroad shipping regulations: None.*

Narcotine (Narcotina) $C_{22}H_{23}O_7N$.
Color and properties: White, silky needles, tasteless, odorless. Forms unstable salts with acids which are dissociated by water. Almost free of narcotic properties of morphine.
Constants: Fuses at 175°C.; decomposes at higher temperatures with evolution of ammonia; at 220°C. hemipinic acid is obtained as a residue.
Soluble in ether and water.
Derivation: (1) By macerating opium with water. (2) By digesting opium with ether and evaporating the solution.
Uses: Medicine (spinal stimulant, respiratory stimulant and, if combined with morphine, reduces dangerous respiratory depression).
Railroad shipping regulations: None.*

Nargol (Silver nucleinate).
Color and properties: Light, brownish-white powder. Contains 10% silver. Solution changes slowly on standing.
Soluble in water.
Uses: Medicine: (antiseptic, astringent, inflammation of mucous membrane, unofficial).
Railroad shipping regulations: None.*

Native Paraffin. See Ozokerite.

Natrium. The Latin name for sodium, hence the symbol Na in chemical nomenclature.

Natroalunite. See Alunite.

Natrolite. See Zeolites.

Natron. $Na_2CO_3.10H_2O$. A natural hydrous sodium carbonate crystallizing below 20°C. and existing only in solution.

Natural Cement. See under Cements, structural.

Natural Gas. A mixture of gaseous hydrocarbons, having a high calorific value, formed in the earth and usually accompanying petroleum, though sometimes found alone, and frequently confined under great pressure. The composition varies with the locality from which recovered. When it does not contain an appreciable amount of readily condensible gasoline it is known as dry natural gas. Wet natural gas contains readily condensible gasoline. The total mileage of the country's natural gas pipe line system is not so high as is commonly supposed, amounting to about 40,000 miles for the trunk lines and perhaps an equal amount for gathering lines. This mileage is spread over twenty-five states.

The greatest concentration of natural gas pipe

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

lines occurs in Ohio, Pennsylvania and West Virginia, that is, in the general vicinity of Pittsburgh. The majority of the longest lines originate in the Southwest. Texas leads in total natural gas pipe line mileage with over 6,000 miles of main lines.

Natural gas is produced in commercial quantities in twenty-four states—Arkansas, California, Colorado, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Montana, New Mexico, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Utah, West Virginia and Wyoming.

Total production during 1928, the latest year for which official figures are available, amounted to 1,568,139,000,000 cubic feet, of which the three leading producing states—Oklahoma, Texas and California, produced 320,861,000,000, 301,999,000,000 and 246,215,000,000 cubic feet, respectively. These figures cover only marketed output; that is, they do not include gas which has been allowed to dissipate into the air.

The most important gas fields in the United States are the Panhandle field, located in Hutchinson, Carson, Gray, Wheeler, Moore and Potter counties, Texas, and the Monroe field in Morehouse, Union and Ouachita parishes, Louisiana.

The Panhandle is said to contain slightly over one million acres of gas territory in which wells of over ten million cubic feet per day may be drilled. Up to a short time ago, only slightly over one hundred wells had been drilled, but these had a total daily open flow of over three billion cubic feet. The amount of gas recoverable in the Panhandle has been computed at between 4,000 and 8,000 billion cubic feet, which at the present rate of withdrawals (estimated at 250 million cubic feet per day), should last for forty-five to ninety years.

The total amount of recoverable gas in the Monroe field has been estimated at about 2,200 billion cubic feet, that of the nearby Richland field at 1,500 billion cubic feet. At the present rate of withdrawals from both fields—about 600 million cubic feet per day—the total of 3,700 billion cubic feet should last for about seventeen years, it is estimated.

Typical analyses: *Allen County, Kan.* Methane 94.50%; helium 0.18%; nitrogen 5.08%; oxygen 0.23%. *Chase County, Kan.* Methane 78.60%; helium 0.56%; carbon dioxide 0.15%; nitrogen 12.13%; oxygen 0.30%; other hydrocarbons 8.26%. *Fresno County, Calif.* Methane 88.00%; carbon dioxide 11.10%; nitrogen 0.90%. *King County, Calif.* Methane 87.70%; carbon dioxide 10.50%; nitrogen 1.80%. *Los Angeles County, Calif.* Methane 91.00%; carbon dioxide 1.00%; nitrogen 5.20%; oxygen 0.10%; other hydrocarbons 2.70%. *Santa Barbara County, Calif.* Methane 62.70%; carbon dioxide 15.50%; nitrogen 1.40%; oxygen 0.20%; other hydrocarbons 20.20%. *Caddo Field, La.* Methane 95.00%; carbon dioxide 2.34%; nitrogen 2.56%; other constituents 0.01%. *Chautauqua County, N. Y.* Methane 90.05%; carbon dioxide 0.41%; nitrogen 9.54%. *Oklahoma.* Sample (a) Methane 92.4%; carbon dioxide 1.4%; nitrogen 3.1%; other constituents 3.1%. Sample (b) Methane 75.4%; carbon dioxide 0.3%; nitrogen 6.6%; other constituents 17.7%. Sample (c) Methane 69.4%; carbon dioxide 0.1%; nitrogen 9.9%; other constituents 20.6%. Sample (d) Methane 92.1%; carbon dioxide 0.4%; nitrogen 3.4%; other constituents 4.1%. Sample (e) Methane 95.2%; carbon dioxide 1.3%; nitrogen 3.5%; other constituents 0%. Sample (f) Methane 88.6%; carbon dioxide 1.4%; nitrogen 4.4%; other constituents 5.6%. Sample (g) Methane 66.5%; carbon dioxide 0.3%; nitrogen 12.5%; other constituents 20.7%. Sample (h) Methane 85.1%; carbon dioxide 1.0%; nitrogen 5.1%; other constituents 8.8%. *McKean County, Pa.* Methane 90.38%; carbon dioxide 0.21%; nitrogen 9.41%; oxygen trace. *Washington County, Pa.* Methane 84.26%; carbon dioxide 0.44%; nitrogen 15.30%; oxygen trace. *Westmoreland County, Pa.* Methane 97.7%; carbon dioxide 0.28%; nitrogen 2.02%; oxygen trace. *Texas.* Sample (a) Methane 98.0%; carbon dioxide 0.7%; nitrogen 1.3%; other constituents 0%. Sample (b) Methane 50.6%; carbon dioxide 0.1%; nitrogen 38.4%; other constituents 10.9%. Sample (c) Methane 51.3%; carbon dioxide 0.1%; nitrogen 38.2%; other constituents 10.4%. Sample (d) Methane 51.5%; carbon dioxide none; nitrogen 38.3%; other constituents 10.2%. Sample (e) Methane 51.1%; carbon dioxide none; nitrogen 38.9%; other constituents 10.0%. Sample (f) Methane 50.6%; carbon dioxide 0.1%; nitrogen 38.4%; other constituents 10.9%. Sample (g) Methane 50.6%; carbon dioxide 0.1%; nitrogen 38.6%; other constituents 10.7%. *Marion County, W. Va.* Methane 81.60%; carbon monoxide 0.40%; carbon dioxide 0.10%; nitrogen 3.21%; oxygen 0.20%; hydrogen 0.20%; other hydrocarbons 14.29%.

Uses: Fuel; recovery of helium and gasoline; manufacture of carbon black.

Railroad shipping regulations: Not commonly shipped by rail.

Neats-foot Oil (Bubulum oil; Hoofoil).

Color and properties: A fixed, pale yellow oil. Inodorous.

Constants: Sp.gr. 0.916; saponification value 194 to 199; iodine value 70.

Soluble in alcohol, ether, chloroform and kerosene.

Derivation: By boiling in water the shin-bones and feet (deprived of hoofs) of cattle and separating the oil from the fat obtained.

Adulterants: Rape, cotton-seed, fish and mineral oils.

Grades: 20°; 30°; 40°F.; cold test, being the temperature in degrees F. at which stearin separates.

Containers: Wooden barrels.

Uses: Leather industry for "fat liquoring"; waterproofing and softening leather; lubricant; oiling wool.

Needlestone (Hairstone). A variety of quartz (q.v.) containing needles of rutile (q.v.), actinolite (q.v.).

Nemalite. See Brucite.

Neoarsphenamine (Neosalvarsan; Novarsenobenzol-Billon; Neodiarsenol; Neokharsivan) $NH_2OHC_6H_3As:AsC_6H_3OHNH(CH_2O)OSNa$ (partially).

Color and properties: Yellow powder, containing not less than 19% arsenic. Odorless or slight odor. Poisonous! Oxidized by exposure to air, either as the powder or in solution, and becomes more toxic and darker.

Soluble in water and glycerol; slightly soluble in alcohol; almost insoluble in acetone, chloroform, ether.

Derivation: Interaction of arsphenamine dihydrochloride and sodium formaldehyde sulfoxylate solutions to which is added, after intervals, 10% sodium carbonate solution, followed by 12% hydrochloric acid solution. Sodium hydroxide solution is added to the precipitated methylene sulfinic acid derivative of arsphenamine and the resulting neoarsphenamine precipitated by strong alcohol or acetone.

Grades: U.S.P.

Containers: Ampules.

Uses: Medicine (the same as arsphenamine).

Railroad shipping regulations: None.*

Neoarsycodile. See Disodium methyl arsenate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Neobornyval (Bornyl Isovalerylglycollate) $(CH_3)_2CHCH_2COOCH_2COOC_{10}H_{17}$.
The isovalerylglycolic ester of borneol. Used in medicine for the same purposes as bornyval, but it is not so liable to disturb the stomach, due to its being less subject to the action of the gastric juices.
Railroad shipping regulations: None.*

Neocinchophen. See Methylphenylquinolinecarboxylicethyl ester.

Neocolemanite. See Colemanite.

Neodiarsenol. See Neoarsphenamine.

Neodymia. See Rare earths.

Neodymium Nd.
Color and properties: One of the metallic elements of the rare earth group yielding red salts.
Constants: Sp.gr. 6.9563; m.p. 840°C.
Decomposes water.
Derivation: From monazite sand in the form of salts, by extraction with acids.
Grades: Technical.
Containers: Boxes.
Uses: Neodymium salts.
Railroad shipping regulations: None.*

Neoerbium. See Erbium.

Neo-euguform. 50% solution of euguform (q.v.) in acetone.
Railroad shipping regulations: Red label.

Neohexal. Secondary hexamethylenetetraminesulfosalicylate, used in medicine as a urinary antiseptic. Unofficial.
Railroad shipping regulations: None.*

Neokharsivan. See Neoarsphenamine.

Neoquinophan. See Ethyl-6-methyl-2-phenylquinoline-4-carboxylate.

Neosaccharin. See Saccharin.

Neosalvarsan. See Neoarsphenamine.

Neo-silvol. A compound of silvol with an iodide containing 18 to 22% colloidal silver iodide.
Uses: Medicine (same as silvol, q.v., unofficial).
Railroad shipping regulations: None.*

Neon Ne.
Color and properties: Colorless wholly inert gas, does not combine chemically with any element.
Liquefies at −245.92°C.
Derivation: By fractional distillation of liquid air.
Grades: Technical; highest purity.
Containers: Technical, steel cylinders; H.P., hermetically sealed glass flasks.
Uses: Filling luminescent electric tubes and photoelectric bulbs.
Railroad shipping regulations: Green gas label.

Neoytterbium. See Ytterbium.

Neozone. A proprietary name applied to a class of antioxidants and rubber age resisters. They are said to be made from phenyl-alpha-naphthylamine and its derivatives. Their specific gravities range from 1.16 to 1.19. Used as general antioxidants and to prevent tread cracking.

Nepeta. See Cataria.

Nephilite.
A complex mineral, essentially a sodium-aluminum silicate. There is, however, always a variable excess of silica and partial replacement of the sodium by potassium or calcium. It has been suggested that the composition approximates $Na_6K_2Al_8Si_9O_{34}$.
Constants: Sp.gr. 2.55 to 2.65; hardness 5.5 to 6.
Found in two varieties:
Glassy: Small glassy white, yellow or colorless grains or crystals of vitreous luster. Found in volcanic rocks.
Greasy (Elaeolite). Usually massive or sometimes coarse crystals. Found in plutonic rocks. Color, gray, red, green, brown. Luster, greasy. Sometimes used as a gem stone.
Occurrence: United States (Maine, Massachusetts, New Hampshire, Arkansas, New Jersey, Texas, Colorado, Montana, South Dakota), Canada, Italy, Germany, Bohemia, Norway, Russia, Portugal, Hungary, France, Brazil, South Africa.
Uses: Possible source of potash.

Nephrine, Para-.
Color and properties: Yellow, very hygroscopic, friable mass; the constituent of the suprarenal glands which raises the blood pressure.
Soluble in water and methyl alcohol; insoluble in alcohol and ether.
Derivation: By extraction from suprarenal capsules, without the use of acids or alkalis.
Impurities: Albumoses and peptones.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; dentistry.
Railroad shipping regulations: None.*

Nephrite. See Jade.

Nepouite. A finely crystalline variety of garnierite (q.v.) corresponding to the formula $3(Ni,Mg)O.2SiO_2.2H_2O$. Contains 18 to 50% nickel oxide.

Neradol.
Color and properties: Dark brown liquid.
Derivation: Soluble phenol or cresolformaldehyde condensation products used in conjunction with other tanning extracts in the tanning industry.
Grades: Technical.
Containers: Barrels.
Uses: Leather tanning.
Railroad shipping regulations: None.*

Nerattein. See Sodium-para-ethoxyphenylaminomethane sulfonate.

Nerol.
Color and properties: Colorless liquid isomeric with geraniol; rose-neroli odor.
Derivation: Iodization of geraniol with hydriodic acid, followed by treatment with alcoholic soda.
Uses: Perfumery.
Railroad shipping regulations: None.*

Neroli Oil (Bitter orange-flower oil).
Color and properties: Essential oil; yellowish, becoming brownish-red on exposure to light; intense, pleasant orange blossom odor; bitter, aromatic taste.
Chief known constituents: Pinene, camphene, dipentene, paraffin, linalool, linalyl acetate, terpineol, geraniol, geranyl acetate, anthranilic acid methyl ester.
Constants: Sp.gr. 0.870 to 0.881 at 15°C.; optical rotation +1°30′ to +9°8′ (usually not above +7°); refractive index 1.468 to 1.474; acid value up to 1.8; ester value 19 to 69.
Solubility in alcohol: In 1 to 2 vols. of 80% alcohol.
Derivation: Distilled from the fresh flowers of the bitter orange, Citrus bigardia, Risso or Citrus aurantium, L., subspecies amara, L.
Adulteration: Bergamot and petitgrain oils.
Uses: Perfumery; flavoring.
Railroad shipping regulations: None.*

Neroli Oil, Portugal (Sweet orange-flower oil).
Color and properties: Essential oil; dark yellow; odor unlike that of ordinary neroli oil.
Chief known constituents: Camphene, limonene, linalool, anthranilic acid methyl ester.
Constants: Sp.gr. 0.8571 to 0.893 at 15°C.; optical rotation +16°8′ to +45°16′; refractive index 1.4727 to 1.4745; acid value 1.6 to 3.7; ester value 6.8 to 16.7.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Solubility in alcohol: Insoluble in 80% alcohol; soluble in 0.3 to 2.5 vols. of 90% alcohol.

Derivation: The genuine oil is distilled from the flowers of the sweet orange (citrus aurantium, L. subspecies sinensis) but many oils, available commercially, are mixtures of different aurantiaceous oils.

Uses: Perfumery; flavoring.

Railroad shipping regulations: None.*

Nerolin. See Naphthylmethyl ether, beta-.

Nerolin II. See Naphthylethyl ether, beta-.

Nerve Oil. Neatsfoot oil (q.v.).

Nerve Root. See Cypripedium.

Nessler's Reagent. Solution of mercuric iodide in potassium iodide, used in detecting the presence of ammonia, particularly in very small amounts.

Neuberg Blue. A mixture of copper blue and Chinese blue. It can be more easily ground in oil than pure copper blue.

Neurodin. See Acetyl-para-oxyphenylurethane.

Neuronal. See Diethylbromacetamid.

"Neutral Alum."

Derivation: By adding sodium or potassium carbonate or caustic soda to an alum solution.

Uses: In mordanting, because of the readiness with which it deposits aluminum hydroxide on the fiber.

Neutral Oil. A term used in the petroleum industry. Sub-Committee 20 on Nomenclature of Committee D-2 on Petroleum Products and Lubricants of the American Society for Testing Materials have informed us that, in their opinion, an attempt to define the term neutral oil is not advisable because a neutral oil is not a definite product. They state that the term may be applied to any number of different oils which may be used for lubricating purposes, the one requirement being that the oil must be a distillate. It may be made from any crude by any method of refining.

For those who wish to investigate the term further the following definitions are reproduced from page 906 of Day's Handbook of the Petroleum Industry.

"1. (Bacon) Oils carrying paraffin which are obtained by the steam distillation of paraffin-base petroleum after the second grade illuminating oil has been run off. Neutral oil carrying paraffin is known as 'wax distillate.'

"2. (A. D. Smith) Lubricants of medium viscosity and fire test, usually filtered, obtained by reduction of pressed distillate from 'wax oil' or 'wax distillate.'"

The following are characteristics of three viscous neutral oils and one non-viscous neutral oil from Pennsylvania crude:

Viscous:

Gravity °Bé.	Saybolt viscosity (70°F.)	Cold test (°F.)	Fire test (°F.)	Flash point (°F.)
30.4	150	15	440	375
30.2	180	20	450	400
30.0	200	70	475	410

Non-Viscous:

Gravity °Bé.	Saybolt viscosity (70°F.)	Cold test (°F.)	Fire test (°F.)	Flash point (°F.)
30	90	15	420	370

Neutral oils are often mixed with animal and vegetable oils.

Railroad shipping regulations: None.*

Neutral Sodas. See Sodas, modified.

Nevile and Winther's Acid. See 1-Naphthol-4-sulfonic acid.

Nevraltein. See Sodium-para-ethoxyphenylamino-methane sulfonate.

Nevyanskite. The lighter colored variety of iridosmine (q.v.). Contains over 40% iridium. Sp.gr. 18.8 to 19.5. See also Sysertskite.

New Blue. See Iron blues.

New Green. See Copper acetoarsenite.

New Sidonal. A mixture of quinic anhydride and quinic acid used in medicine as a diuretic. Unofficial.

New Silver. See German silver.

Newton's Alloy. See table under Fusible metals.

Niatan. A liquid extract said to contain 23% tans with an ash of less than 5%. It is free from insolubles and is of exceptionally high purity. It does not contain any free sulfuric acid. Niatan may be made up to special specifications on request.

Derivation: A sulfonated condensation product of pure acetaldehyde and U.S.P. phenol.

Containers: 50, 100 lb. kegs; 500 lb. barrels.

Uses: Leather tanning.

Niccolite (Arsenical nickel).

NiAs, As replaced to some extent by Sb or S, and Ni by Fe or Co.

Pale copper-red mineral with dark tarnish, metallic luster. Contains 43.9% nickel.

Soluble in concentrated nitric acid.

Constants: Sp.gr. 7.3 to 7.67; hardness 5 to 5.5.

Occurrence: United States (Nevada, Connecticut, Michigan), Canada (Ontario), Newfoundland, Argentina, Germany, Portugal.

Uses: Nickel ore.

Nicholsonite. A variety of the mineral aragonite, $CaCO_3$, containing from less than 1 to 10% of zinc. Found in Colorado.

Nichrome. A ferrous alloy containing 60% nickel, 24% iron, 16% chromium, 0.1% carbon. It is used principally for electrical resistance purposes. Nichrome castings, which contain 60% nickel, 25% iron, 15% chromium and 0.7% carbon, are resistant to cold sulfuric acid in all concentrations and to hot (not boiling) sulfuric acid in all strengths except concentrated (95%). It also offers good resistance to mine and sea waters and moist sulfurous atmospheres.

Nichrome IV. A non-ferrous alloy containing 80% nickel and 20% chromium. Used especially for electrical resistance wire.

Nickel Ni.

Color and properties: Very hard, silvery metal, with a faint tinge of yellow; takes a high polish.

Occurrence: Chiefly as pentlandite $(Ni,CuFe)S$ at Sudbury, Ontario, and garnierite $(Mg,Ni)SiO_4$ in New Caledonia.

Constants: Sp.gr. 8.63; m.p. 1450°C.

Soluble in dilute mineral acids; insoluble in water.

Derivation: (a) Matte process. The ore is roasted and smelted in a blast-furnace to obtain the matte, consisting of nickel, copper and iron sulfide. The latter is smelted in a converter to remove most of the iron. The matte is then smelted by the Orford process in a blast-furnace with salt-cake and coke. The resulting nickel sulfide is dead-roasted to nickel oxide and the latter reduced to metallic nickel by fusing in graphite crucibles with charcoal. (b) Mond process. The matte, nearly free from iron, produced as above, is dead-roasted, crushed and treated with warm, dilute sulfuric acid to remove the copper. The residue is reduced in a tower by means of water gas. (c) Browne electrolytic process. The copper-nickel matte is crushed, dead-roasted, reduced to metal in a reverberatory furnace and cast into anode plates. The latter are electrolyzed, the nickel going into the electrolyte solution. Any copper remaining in the electrolyte is precipitated as sulfide, and the iron removed by means of caustic soda. The solution is now concentrated to allow sodium chloride to crystallize, and the hot solution of nickel chloride is electrolyzed.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Corrosion resistance: One manufacturer states that the corrosion-resistance of nickel, having the following composition, 99 to 99.5% nickel † cobalt, 1 to 0.25% carbon, 1 to 0.25% silicon, 1 to 0.3% manganese, 1 to 0.55% iron, 1 to 0.25% copper, is as follows: The rate of corrosion in mineral acids depends upon the exposure conditions and type of apparatus. It is used in special cases, with sulfuric acid to replace cheaper materials; commonly with hydrochloric acid; not considered practical with nitric acid although more resistant than monel metal. It is commonly used with acetic acid but the corrosion rate depends upon conditions of exposure. It is extensively used with sodium hydroxide as it has a very low corrosion rate but with ammonium hydroxide it is only used where its special properties make it advantageous.

Method of purification: Electrolytic refining.

Forms available: Ingots, sheet, plate, strip, rod, wire, angles and shapes, seamless tubes, castings, pipe fittings, forgings, anodes, shot, blocks, wire cloth.

Uses:

Chemical Applications: Manufacture of nickel salts, catalyst.

Chemical and Pharmaceutical Machinery: Agitators, autoclaves, baffles, belts, blow cases, chlorinators, chutes, coils, condensers, containers, conveyors, coolers, crystallizers, digesters, dryers, evaporators, fans, filling machines, filters, fittings, fusion pots, gas scrubbers, heating coils, hoppers, jacketed kettles, kettles, laboratory apparatus, linings, mixers, pipe lines, pots, pumps, pump rods, screens, shafts, stills, tanks, trays, trucks, vacuum pans, valves, vats.

Metallurgical Applications: Alloys, burner parts, burning points, carbon combustion boats, fire brick bolts, carbonizing boxes, enameling racks, furnace linings, oven linings, pyrometer protection tubes.

Electrical Applications: Contacts, electrode holders, electrodes, lead wires, loud speaker diaphragms, rectifier parts, spark plug electrodes, storage battery elements, vacuum tube parts, Edison cell parts.

Dairy Equipment: Aging equipment, coils, coolers, dump tanks, filling machinery, filters, fittings, forewarming tanks, heaters, holding tanks, hoppers, milker pails, pasteurizers, pipe lines, pumps, ripeners, tanks, trucks, truck tanks, vacuum pans, valves, vats, weigh cans.

Food Product Machinery: Bins, blanchers, bottling machinery, canning machinery, chutes, containers, cooking coils, cooking kettles, evaporators, filling machines, conveyors, filters, fittings, grinders, hoppers, jacketed kettles, kettles, mixers, pans, percolators, pipe lines, pumps, screens, storage tanks, strainers, table tops, trays, trucks, utensils, vacuum pans, valves, vats.

Glass Machinery: Automatic feeders, blow pipes, burner pipes, chain guides, charging ladles, conveyors, cracking irons, etching tanks, lehrs, molds, punty rods, shear blades, skimmers, stowing tools, utensils.

Nickel-ammonium Nitrate $Ni(NO_3)_2.4NH_3.2H_2O$.

Color and properties: Green crystals.

Soluble in water; insoluble in alcohol.

Derivation: By adding ammonium hydroxide to a nitric acid solution of nickel nitrate, with subsequent crystallization.

Method of purification: Recrystallization.

Grades: Technical.

Containers: Glass bottles; wooden kegs.

Uses: Nickel plating.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Nickel-ammonium Sulfate (Nickel salts, double; Ammonium-nickel sulfate) $NiSO_4.(NH_4)_2SO_4.6H_2O$.

Color and properties: Green crystals.

Constants: Sp.gr. 1.929.

Soluble in water and ammonium sulfate solution.

Derivation: An aqueous solution of nickel sulfate is acidified with sulfuric acid, then an aqueous solution of ammonium sulfate is added. On concentrating, crystals of the double sulfate separate out.

Method of purification: Recrystallization.

Grades: Technical; C.P.

Containers: 1, 5 lb. bottles; 400, 425 lb. barrels; 100 lb. kegs; 25 lb. boxes.

Uses: Nickel electrolyte for electroplating.

Railroad shipping regulations: None.*

Nickel Black. See Nickel peroxide.

Nickel Bloom. See Annabergite.

Nickel Bromide (Nickelous bromide) (a) $NiBr_2$ (b) $NiBr_2.3H_2O$.

Color and properties: (a) Brownish-yellow solid or yellow, lustrous scales. (b) Deliquescent, greenish scales.

Constants: Sp.gr.: (a) 4.64. M.p.: (a) Decomposes; (b) Loses water of crystallization at about 200°C.

Soluble in water, alcohol, ether and ammonium hydroxide.

Derivation: By the action of hydrobromic acid on nickel oxide.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Nickel Bromide-ammonia $NiBr_2.6NH_3$.

Color and properties: Violet powder.

Constants: Sp.gr. 1.837.

Soluble in cold water; decomposed by hot water.

Derivation: By crystallizing anhydrous nickel bromide from ammonium hydroxide instead of water.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Nickel Carbonate $NiCO_3$.

Color and properties: Bluish-green crystals.

Constants: M.p.: Decomposes.

Insoluble in water and acids.

Derivation: By the addition of sodium carbonate to a solution of nickel sulfate.

Grades: Technical; C.P.

Containers: Wooden kegs; glass bottles.

Uses: Electroplating; ingredient of ceramic colors and glazes.

Railroad shipping regulations: None.*

Nickel Carbonate, Basic $2NiCO_3.3Ni(OH)_2.4H_2O$.

Color and properties: Green crystals.

Constants: M.p.: Decomposes.

Soluble in acids and solutions of ammonium salts; insoluble in water.

Derivation: By the addition of sodium carbonate to a solution of nickel sulfate.

Grades: Technical.

Containers: Wooden kegs; glass bottles.

Uses: Electroplating; ingredient of ceramic colors and glazes.

Railroad shipping regulations: None.*

Nickel Carbonyl (Nickel tetracarbonyl) $Ni(CO)_4$.

Color and properties: Colorless, volatile liquid; inflammable; poisonous!

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 1.3185; m.p. —25°C.; b.p. 43°C.; vapor explodes at 60°C.

Soluble in alcohol and concentrated nitric acid; insoluble in water.

Derivation: By passing carbon monoxide gas over finely divided nickel.

Grades: Technical.

Containers: Iron drums.

Uses: For production of metallic nickel by Mond process.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label(?)*

Nickel Chloride

(a) $NiCl_2$ (b) $NiCl_2.6H_2O$.

Color and properties: (a) Brown scales; deliquescent in moist air. (b) Green scales; deliquescent in moist air.

Constants: Sp.gr.: (a) 2.56; m.p.: Sublimes.

Soluble in water and ammonium hydroxide.

Derivation: By the action of hydrochloric acid on nickel oxides.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: 1, 5 lb. bottles; 275 lb. barrels; 100, 50 lb. kegs; 25 lb. boxes.

Uses: Nickel-plating cast zinc; manufacture of sympathetic ink; antiseptic; absorbent for ammonia gas in military and industrial gas masks.

Railroad shipping regulations: None.*

Nickel Cyanide $Ni(CN)_2.4H_2O$.

Color and properties: Apple-green plates or powder; poisonous!

Constants: M.p.: Loses $4H_2O$ at 200°C.; b.p.: Decomposes.

Soluble in ammonium hydroxide and potassium cyanide solution; insoluble in water and acids.

Derivation: By adding potassium cyanide to a solution of a nickel salt.

Grades: Technical.

Containers: Wooden kegs; glass bottles.

Uses: Metallurgy; electroplating; galvanoplastic work.

Railroad shipping regulations: Class B poison.

Nickel Glance. Natural nickel-arsenic sulfide, NiAsS.

Nickel Hydroxide

(a) Nickelous $4Ni(OH)_2.H_2O$

(b) Nickelic $Ni(OH)_3$.

Color and properties: (a) Pale green powder. (b) Black powder.

Constants: Sp.gr.: (a) 4.36. M.p.: (a) Decomposes; (b) Decomposes.

(a) Soluble in acids, ammonium hydroxide and alcohol; insoluble in water and alkalis.

Derivation: (a) By adding caustic soda to a solution of nickel salt. (b) By adding a hypochlorite to a solution of a nickel salt.

Grades: Technical; C.P.

Containers: Wooden kegs; glass bottles.

Uses: Nickel salts.

Railroad shipping regulations: None.*

Nickel Nitrate $Ni(NO_3)_2.6H_2O$.

Color and properties: Green, deliquescent crystals. Keep well stoppered.

Constants: Sp.gr. 2.065; m.p. 56.7°C.; b.p. 136.7°C.

Soluble in water and alcohol.

Derivation: By the action of nitric acid on nickel oxide.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: Glass bottles; wooden kegs.

Uses: Nickel plating.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Nickel Oxide (Nickelous oxide; Nickel protoxide; Green nickel oxide) NiO.

Color and properties: Green powder, becoming yellow; is found in nature as the mineral bunsenite.

Constants: Sp.gr. 6.6 to 6.8; m.p.: Absorbs oxygen at 400°C. and is reduced to NiO at 600°C.

Soluble in acids and ammonium hydroxide; insoluble in water.

Derivation: By heating nickel hydroxide or nitrate.

Grades: Technical; C.P.

Containers: Wooden kegs; glass bottles.

Uses: Nickel salts; porcelain painting.

Railroad shipping regulations: None.*

Nickel Oxide, Black. See Nickel peroxide.

Nickel Oxide, Green. See Nickel oxide.

Nickel Peroxide (Nickelic oxide; Nickel sesquioxide; Black nickel oxide; Black nickel) Ni_2O_3.

Color and properties: Gray-black powder.

Constants: Sp.gr. 4.84; m.p.: Is reduced to NiO at 600°C.

Soluble in acids and ammonium hydroxide; insoluble in water.

Derivation: By gentle heating of the nitrate or chlorate.

Grades: Technical; C.P.

Containers: 1 lb. bottles; tins.

Uses: Production of oxygen; storage batteries.

Railroad shipping regulations: None(?)*

Nickel Plating. A process for the production of a coating of substantially 100% pure nickel on a metallic cathode. This process is carried out in an aqueous solution of nickel salts containing in addition certain other acids or salts to improve the performance of the electrolyte or the character of the deposit.

Electrolytes of this nature may be roughly classified as single nickel salt baths or double nickel salt baths. Generally speaking, the single nickel salt baths are capable of plating faster, i.e., at higher current densities, with, however, the production of deposits which will be harder to buff to a desired color.

A typical single nickel salt bath is:

	Normality	Grams per Liter	Ounces per Gallon
Nickel sulfate ($NiSO_4.7H_2O$)	1.70	240	32
Nickel chloride ($NiCl_2.6H_2O$)	0.12	15	2
Boric acid (H_3BO_3)	0.48M	30	4

This solution is operated at a current density of 2 to 5 amperes/square decimeter (19 to 40 amperes/square foot) and a temperature of 48° to 60°C. (120° to 140°F.). The pH is about 4.0 to 5.7.

A typical double nickel salt bath is:

	Normality	Grams per Liter	Ounces per Gallon
Nickel ammonium sulfate $NiSO_4.(NH_4)_2SO_4.6H_2O$	0.30	60	8
Nickel sulfate ($NiSO_4.7H_2O$)	0.21	30	4
Sodium chloride (NaCl)	0.26	15	2
Boric acid (H_3BO_3)	0.24M	15	2

The current density used is 0.43 to 0.75 amperes/square decimeter (4 to 7 amperes/square foot) and the temperature 15° to 27°C. (60 to 80°F.). The pH is 5.5 to 5.8.

A special solution for plating on zinc or die cast metal is:

	Normality	Grams per Liter	Ounces per Gallon
Nickel sulfate ($NiSO_4.7H_2O$)	0.85	120	16
Sodium sulfate ($Na_2SO_4.10H_2O$)	1.12	180	24
Sodium chloride (NaCl)	0.25	15	2
Boric acid (H_3BO_3)	0.24M	15	2

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

The current density used is 1.6 to 2.2 amperes/square decimeter (15 to 20 amperes/square foot) and the temperature of operation about 20°C. (70°F.). The pH should be 5.5 to 5.8.

Nickel anodes are used and should preferably be of 99% purity of either the cast or rolled type. Such high purity anodes will readily become passive, i.e., will not dissolve except in the presence of certain anions such as Cl. A convenient method of introducing such anions is in the form of $NiCl_2$ which has the added advantage of increasing the metal content of the electrolyte without introducing additional cations. However, sodium or ammonium chloride is frequently used in place of nickel chloride. The boric acid serves to regulate the acidity or act as a "buffer," and also is useful in assisting to produce a whiter, softer deposit.

The regulation of acidity of pH is important for the production of good deposits. The acidity range usually employed varies from pH 4.0 to 6.3. A bath with too low an acidity, i.e., too high a pH will produce a dark, brittle deposit which is buffed with difficulty, while a low pH may cause pitting.

If the solution gives a pitted deposit of nickel when the correct current density temperature and pH are used, pitting is probably caused by small amounts of harmful organic matter being present in the solution. The best remedy for this condition is to add small amounts of an oxidizing agent such as sodium perborate or hydrogen peroxide. The amount to be added would be of the order of 1 vol. of strong commercial peroxide to 2,000 to 5,000 vols. of plating solution. An excess of peroxide will cause the deposit to be hard to buff and brittle, and may even result in its breaking or curling away from the cathode. Slight additions of sulfuric acid will counteract this latter effect. The pH of the solution must then be raised as the effect of the peroxide wears off.

Addition agents such as cadmium salts and certain organic materials are used to produce a more lustrous deposit, but these, especially the latter, must be used with great caution.

The presence of impurities such as iron, zinc, and copper produces dark deposits. These may be removed by neutralizing with nickel carbonate to a pH of 6.5 and filtering. A higher pH is to be avoided as this will result in the loss of nickel precipitated as the hydrate, and redissolving of the zinc.

Such baths are usually operated without agitation, although if the solutions are kept clean by filtration, agitated baths may be employed. This agitation should be mild, e.g., a moderate rocking movement of the cathode.

The double salt baths have practically the same operating characteristics as the single nickel salt baths, except that a lower current density is required to prevent burnt or rough deposits. Where a heavy plate is desired, the single salt bath is preferred.

The special solution for plating on zinc, aluminum, or die-cast metals is similar to the single salt solution in that it is operated at moderately high current densities. The high concentration of sodium sulfate gives the solution high conductivity, while the repression of the ionization of the nickel sulfate aids in diminishing the tendency of the nickel to be deposited by simple galvanic action accompanied by solution of the less noble metal from the cathode. Such "flash" or galvanic deposits are not adherent and therefore undesirable. Adherent plating over zinc, aluminum, etc., is further favored by flashing, i.e., plating at high current density for a short time until the cathode is fully covered, and then reducing the current to the normal density until the desired thickness of deposit is obtained.

Throwing Power. The throwing power (See p. 141, Copper Plating for definition of throwing power) of nickel plating solutions is decreased by (a) increase of current density, (b) increase of bath temperature, (c) agitation of the solution, (d) decrease in pH, and (e) decrease in nickel-ion concentration.

The throwing power of a single salt bath at 25°C. at very low current density may be as high as 20%, decreasing to nearly zero at usual operating current densities. Raising the temperature to 40° to 50°C. at usual current densities may decrease the throwing power to perhaps —10%.

Tanks. Nickel plating baths are usually contained in wood, wood lead-lined, or steel rubber-lined tanks. Steel tanks not lined are to be avoided as such tanks are usually grounded and due to the electrolytic action the steel dissolves, contaminating the bath and eventually destroying the tank. The temperature of the solutions is usually controlled by means of lead coils through which steam may be passed, or also by water if cooling of the bath is desired.

Uses. Nickel plating is used mainly as a rust-resisting coating, mainly on steel or brass. For use on steel the thickness employed should not be less than 0.0005″. For use on brass or on steel for indoor use, this thickness may be reduced to about 0.0001″. A plate of less thickness is likely to be cut through in buffing or subsequent polishing in service.

Copper plating is usually employed in conjunction with nickel plating when best protective values of deposit over steel are to be obtained. The plate may consist of two layers, nickel on copper on steel; or better, three layers, nickel on copper on nickel on steel. The total thickness of the best commercial deposits is about 0.001″, while the poorer plating, which still comes on the market in considerable volume, is about one-fifth as thick.

Nickel Protoxide. See Nickel oxide.

Nickel Salts. (a) Single. See Nickel sulfate. (b) Double. See Nickel-ammonium sulfate.

Nickel Sesquioxide. See Nickel peroxide.

Nickel Silvers. Non-ferrous alloys of following compositions: (a) Nickel silver 18%A contains 65% copper, 18% nickel and 17% zinc. It offers good resistance to cold dilute sulfuric and hydrochloric acids and to hot dilute sulfuric acids under certain conditions of operation. It is resistant to cold acetic acid in all concentrations and to hot (not boiling) acetic acid up to 10%, to sodium hydroxide under all conditions and to sea water and moist sulfurous atmospheres. (b) Nickel silver 18% B contains 55% copper, 18% nickel and 27% zinc. It offers approximately the same resistance to corrosion as the 18% A alloy.

Nickel Steel. See Iron and steel (Ferrum).

Nickel Sulfate (Nickel salts, single)
(a) $NiSO_4$; (b) $NiSO_4.6H_2O$; (c) $NiSO_4.7H_2O$.
Color and properties: (a) Yellow crystals; (b) Blue crystals; (c) Green crystals.

Constants:	(a)	(b)	(c)
Specific gravity	3.418	2.031	1.98
Melting-point	Loses SO_3 at 840°C.	Loses $6H_2O$ at 280°C.	98° to 100°C.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

All the sulfates are soluble in water; (b) and (c) are soluble in alcohol; (a) is insoluble in alcohol and ether.
Derivation: By the action of sulfuric acid on nickel oxide.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 300, 400 lb. barrels; 100 lb. kegs; 25 lb. boxes.
Uses: Manufacture of nickel ammonium sulfate; nickel plating; mordant in dyeing and printing textiles; blackening zinc and brass; paints and varnishes; ceramics.
Railroad shipping regulations: None.*

Nickel Tetracarbonyl. See Nickel carbonyl.

Nickelic Oxide. See Nickel peroxide.

Nickelous Bromide. See Nickel bromide.

Nickelous Oxide. See Nickel oxide.

Nicotine (Beta-pyridyl-alpha-normal-methylpyrrolidine) $C_{10}H_{14}N_2$.
Color and properties: Alkaloid from tobacco; thick water-white, levo-rotatory oil, turning brown on exposure to the air; poisonous!
Constants: Sp.gr. 1.00924; m.p.: Below 80°C.; b.p. 246.7°C.
Soluble in water, alcohol, ether and oils.
Derivation: By distilling tobacco with milk of lime and extracting with ether.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; insecticide (horticultural purposes); tanning.
Railroad shipping regulations: None.*

Nicotine Salts
(a) Hydrochloride: $C_{10}H_{14}N_2 . HCl$.
(b) Salicylate: $C_{10}H_{14}N_2 . C_7H_6O_3$.
(c) Sulfate: $(C_{10}H_{14}N_2)_2 . H_2SO_4$.
(d) Tartrate: $C_{10}H_{14}N_2 . 2C_4O_6H_6 . 2H_2O$.
Color and properties: (a) Colorless oil; poisonous! (b) White crystals; poisonous! (c) White crystals; poisonous! (d) White plates; poisonous!
Constants: M.p.: (b) 117.5°C.
All the salts are soluble in water, alcohol and ether.
Derivation: By the action of the respective acid on the alkaloid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; insecticide (horticultural and general purposes).
Railroad shipping regulations: None.*

Nicotinic Acid (Meta-pyridinecarboxylic acid; Beta-pyridinecarboxylic acid) C_5H_4NCOOH.
Color and properties: White crystals.
Constants: M.p. 228°C.; b.p.: Sublimes.
Soluble in hot alcohol; slightly soluble in water and ether.
Derivation: By the interaction of quinolinic and hydrochloric acids.
Method of purification: Crystallization.
Containers: Tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Nigella Sativa (Nutmeg flower; Small fennel flower; Black cumin; Black caraway).
Derivation: Seed of Nigella sativa.
Habitat: Germany and Mediterranean region.
Grades: Technical.
Containers: Bags.
Uses: Medicine; veterinary medicine; snuff.
Railroad shipping regulations: None.*

Nigger Powder. See under Explosives, Negro powder.

Night Blue. See Iron blues.

Night-blooming Cereus. See Cactus grandiflorus.

Nigrine. See Rutile.

Nigrite. A substitute for gutta-percha said to be made by compounding the residue from the distillation of ozokerite with rubber.

Nigrosine. A class of blue or black dyes, some soluble in water, some in alcohol and some in oil, used in manufacture of ink and shoe-polish and in dyeing leather, wood, textiles, etc.

Niobe Oil. See Methyl benzoate.

Niobite. See Columbite.

Niobium. See Columbium.

Nioform. See Iodochloroxyquinoline.

Nirosta. See Sterling Nirosta steel.

Nirvanin. See Diethylglycocoll-paramino-ortho-oxybenzoicmethyl ester hydrochloride.

Nirvanol (Phenylethylhydantoxin) $(NHCO)(CONH)C(C_2H_5)(C_6H_5)$.
Color and properties: Colorless crystalline powder, odorless. Several cases of poisoning have been reported, although other authorities have reported satisfactory use.
Insoluble in water.
Uses: Medicine (hypnotic, the soluble sodium salt is generally used, unofficial).
Railroad shipping regulations: None.*

Niter (Saltpeter) KNO_3.
A natural potassium nitrate. Color, white, gray, or colorless; streak, white; vitreous luster. Contains 46.5% K_2O, 53.5% N_2O_5. Found as white crusts, needle-like crystals and silky tufts in limestone caverns or as incrustations upon the earth's surface or on rocks. Also found in hot, dry countries as an efflorescence in soils containing human or animal excrement. In such countries advantage has been taken of this and soil, plant ashes and decomposing organic matter (manure) are built into mounds, moistened periodically and the niter finally extracted with water.
Constants: Sp.gr. 2.09 to 2.27; hardness 2.
Occurrence: United States (Kentucky, Wyoming), India, Egypt, Algeria, Persia, Spain, France, Germany.
Uses: See Potassium nitrate.

Niter Balls (Throat balls; Sal prunella).
A very fine grade of potassium nitrate fused into the form of balls.
Railroad shipping regulations: Yellow label.

Niter Cake. See Sodium bisulfate.

Niter, Chile. See Caliche.

Niter, Cubic. See Caliche.

Niton. See Radium emanation.

Nitragin. A pure culture of bacteria. When spread over soil it acts as a promotor rendering more active the fixation of nitrogen.

Nitralloy. Trade name for a series of alloy steels which contain in addition to iron, chromium, molybdenum and aluminum (0.50 to 1.50%). These alloys attain great hardness when heated in a closed container through which a current of ammonia gas is continually passed. The process is known as "nitriding." They are especially recommended for high temperature, high pressure steam service, combining resistance to water and atmospheric corrosion and to the cutting action of steam at high temperatures with resistance to seizing and galling, and the ability to retain all its surface hardness at elevated temperatures. It is also used in the automotive field.

Nitramidine. A nitrocellulose or pyroxylin stated to be made from paper or cardboard.

Nitraniline (Nitroaniline) (a) Meta-; (b) Ortho-; (c) Para-; $NO_2 . C_6H_4NH_2$.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: (a) Yellow needles. (b) Orange-red needles. (c) Yellow needles.

Constants:

	(a)	(b)	(c)
Specific gravity	1.398	1.443	1.437
Melting-point	111.8°C	68.9°C	148°C
Boiling-point	285°C	....	....

Soluble in alcohol and ether; very slightly soluble in water.

Derivation: From aniline by nitration after acetylation, with subsequent removal of the acetyl group by hydrolysis.

Method of purification: Crystallization.

Grades: Technical.

Containers: 100 lb. kegs; 125, 225, 250, 300, 325 lb. barrels.

Uses: (a) Color test for pine wood. (b) Has no commercial uses at present. (c) Production of para-nitraniline red.

Railroad shipping regulations: None.*

Nitraniline-ortho-sulfonic Acid, Para- (Ammonium salt) $C_6H_3NH_2NO_2SO_3NH_4$.

Color and properties: Orange or brown crystals. Soluble in hot water.

Derivation: Sulfonation of para-nitrochlorobenzene and subsequent amination with ammonia under pressure.

Method of purification: Recrystallization.

Grades: Technical (97%).

Containers: Barrels; kegs; steel drums.

Uses: Intermediate for Schultz Dyes, Nos. 132, 133 and 458.

Railroad shipping regulations: None.*

Nitrated Oils.

Castor or linseed oils nitrated by the action of mixed acid. The resulting product is a syrupy liquid which will form a homogeneous mixture with nitrocellulose.

Uses: When dissolved in a suitable solvent, e.g. acetone, varnishes are formed which are used for enamelling leather, etc.

Railroad shipping regulations: None.*

Nitratine. See Sodium nitrate.

Nitrating Acid. A mixture of sulfuric and nitric acids (often called "mixed acid") used for nitrating cellulose, phenol, toluene, etc.

Nitre. See Niter (Saltpeter).

Nitre Balls. See Niter balls.

Nitre Cake. See Sodium bisulfate.

Nitre, Chile. See Caliche.

Nitre, Cubic. See Caliche.

Nitric Acid (Aqua fortis; Hydrogen nitrate; Azotic acid) HNO_3.

Color and properties: Transparent, colorless or yellowish, fuming, suffocating, caustic and corrosive liquid.

Constants: Sp.gr. 1.530; m.p. -41.3°C.; b.p. 86°C.

Soluble in water and alcohol.

Derivation: (a) By the action of sulfuric acid on sodium nitrate. The sodium nitrate used is purified Chile saltpeter, 98 to 99%. It must be free from chlorides. The nitrate of soda and sulfuric acid are heated in a retort and the vapors which escape are condensed in a series of glass or earthenware Woulff bottles, or in condensers of special form and materials. At the end of the series is placed a coke tower, fed with water or concentrated sulfuric acid to condense the fumes, escaping from the bonbonnes. In the Valentiner process, distillation is performed in a vacuum. (b) Oxidation of ammonia by the catalytic process, which has the advantage of delivering a purer nitric acid than that obtained from nitrate of soda and has the disadvantage of being a weak acid which requires subsequent concentration. With the development of synthetic ammonia plants and under existing commercial conditions, this latter process is claimed to be the cheaper. (c) Nitric acid can be obtained by the direct fixation of atmospheric nitrogen, but most of the plants using this method have been modified, owing to the excessive power consumption.

Method of purification: Rectification.

Grades: Technical (usually 36° to 44°Bé. Grade generally known as aqua fortis being about 41½°Bé. or 65.67% HNO_3); C.P.; U.S.P.; Pure; Fuming (See Nitric acid, fuming).

Strength of solutions: 38°, 40°, 42°, 43°Bé.

Containers: Carboys; glass bottles. Often shipped mixed with concentrated sulfuric acid in iron drums or tank cars; also in aluminum and chrome alloy steel drums.

Uses: Organic synthesis; manufacture of dyes, drugs, explosives, celluloid and nitrates; metallurgy; medicine; photo-engraving; etching steel tools and the like.

Fire hazard: Dangerous.*

Railroad shipping regulations: White label.

Nitric Acid, Fuming (Nitrosonitric acid) Nitric acid containing more than 86% HNO_3, and having a sp.gr. above 1.480.

Caution! Violently corrosive and will promote combustion in contact with most organic substances.

Nitric Ether. See Ethyl nitrate.

Nitriding. See Nitralloy.

Nitroacetanilide, Para- $NO_2C_6H_4NHCOCH_3$.

Color and properties: White crystals.

Constants: M.p. 207°C.

Soluble in alcohol and ether; very slightly soluble in water.

Derivation: By acetylating aniline, then nitrating.

Method of purification: Crystallization.

Grades: Technical.

Containers: 300, 325, 375 lb. barrels.

Uses: Manufacture of para-nitraniline.

Railroad shipping regulations: None(?)*

Nitroaniline. See Nitraniline.

Nitroanisole, Ortho- $C_6H_4OCH_3NO_2$.

Color and properties: Light reddish or amber liquid.

Constants: Sp.gr. 1.255 (20/20°C.); crystallizing point 9.6°C.; boiling range 268° to 271°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: From ortho-nitrophenol by methylation or from ortho-nitrochlorobenzene by action of methanol (methyl alcohol) and caustic soda.

Method of purification: Distillation.

Grades: Technical.

Containers: Galvanized drums.

Uses: Organic synthesis; manufacture of intermediates for dyes and pharmaceuticals.

Railroad shipping regulations: None.*

Nitrobenzene (Nitrobenzol; Oil of mirbane; Oil of myrbane; Essence of mirbane; Essence of myrbane).

Color and properties: Bright yellow crystals or yellow, oily liquid; poisonous!

Constants: Sp.gr. 1.19867; m.p. 8.70°C.; b.p. 210.85°C.

Soluble in alcohol and ether; very slightly soluble in water.

Derivation: From benzene by nitrating with nitric acid.

Method of purification: By washing and distilling with steam, then redistilling.

Impurities: Unconverted benzene.

Grades: Technical.

Containers: Glass bottles; various tins; 500, 1,000 lb. iron drums.

Uses: Manufacture of dust preventatives; raw material for manufacture of aniline, benzidine, quinoline, azobenzene, etc.

Railroad shipping regulations: Class B. poison.

Nitrobenzeneazoresorcinol, Para- $NO_2C_6H_4N_2C_4H_3(OH)_2$.

Color and properties: Red crystals.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: M.p. 198°C.
Slightly soluble in water; soluble in nitrobenzene.
Derivation: Diazotized para-nitroaniline is coupled with resorcinol.
Method of purification: Recrystallization.
Grades: Analytical.
Containers: Glass bottles.
Uses: Determination of magnesium.
Railroad shipping regulations: None.*

Nitrobenzenesulfonic Acid $C_6H_5O_5NS$.
Color and properties: White plates.
Soluble in alkaline solutions.
Derivation: Sulfonation of nitrobenzene.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: For other intermediates.
Railroad shipping regulations: None.*

Nitrobenzoic Acid $C_6H_4(NO_2)COOH$.
(a) Meta-, (b) Ortho-, (c) Para-
Color and properties: Yellowish-white crystals.
Constants: (a) Sp.gr. 1.494; m.p. 140° to 141°C.; (b) Sp.gr. 1.575; m.p. 147.7°C.; (c) Sp.gr. 1.5497; m.p. 238°C.
(a) Soluble in alcohol and ether; slightly soluble in water; (b) Soluble in water, alcohol and ether; (c) Soluble in alcohol; sparingly soluble in water.
Derivation: (a and b) By the nitration of benzoic acid, (c) By the oxidation of para-nitrotoluene by hot chromic acid mixture.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: (a and b) Organic synthesis; (c) Preparation of anesthetics and as intermediate in the manufacture of some dyes.
Railroad shipping regulations: None.*

Nitrobenzol. See Nitrobenzene.

Nitrocellulose.
A material obtained by nitrating cellulose (in the form of linters, cotton waste, cotton-wool, tissue paper or wood pulp) i.e., subjecting it to the action of mixed acid (q.v.). By varying the strength of the acid, its temperature, the time of nitration and the proportion of acid to cellulose, products of widely different properties are obtained. Some of the principal are:
Guncotton (Nitro-cotton): Yellow, amorphous, odorless, tasteless, neutral matted mass. Contains from 13.0 to 13.7% nitrogen. Sp.gr. (absolute) 1.66 at 15.6°C. Soluble in acetone, ethylacetate. Insoluble in ether-alcohol (or not exceeding 13%), nitroglycerin, and other solvents of the lower nitrates.
Uses: Explosive.
Pyroxylin for smokeless powders and gelatin dynamites: Contains 12.4 to 12.8% nitrogen. Pyrocellulose (pyro, pyrocotton) is the standard of this class. It contains 12.60% plus or minus 0.1% of nitrogen. Almost completely soluble (99%) in ether-alcohol. Less soluble in methyl alcohol, amyl acetate, and camphor-alcohol than the lower nitrates.
Uses: Smokeless powders; gelatin dynamites; photographic films.
Soluble pyroxylins: Termed variously collodion cotton, soluble cotton, varnish cotton. Contain close to 12% nitrogen. Soluble in ether-alcohol, amyl alcohol, amyl acetate, methyl alcohol, acetone and other solvents to solutions of less viscosity than any other pyroxylins.
Uses: Collodion; lacquers; bronzing liquids; enamels; dopes; cements; etc.
Celluloid pyroxylins: Contain 10.8 to 11.6% nitrogen. Soluble in ether-alcohol, amyl acetate, methyl alcohol and other solvents but give solutions of greater viscosity than the varnish cottons.
Pyroxylins containing 10% nitrogen: Soluble in grain alcohol. No industrial applications.
Pyroxylins containing less than 10% nitrogen: Insoluble in organic solvents. No industrial applications.
Fire hazard: Dangerous.*
Railroad shipping regulations: Nitrocellulose (a) dry: High explosive; (b) wet with solvent: Red label; (c) wet with water: Yellow label.

Nitrochlorobenzene (Nitrochlorobenzol) (a) Ortho-; (b) Para-. $NO_2.C_6H_4NH_2$.
Soluble in alcohol and ether; insoluble in water.
Derivation: By nitration, yielding a mixture of the ortho- and para-nitrochlorobenzenes.
Grades: Technical.
Containers: 300 lb. barrels.
Uses: Intermediates; dyes.
Railroad shipping regulations: Class B poison.

Nitrochlorobenzenesulfonic Acid, Ortho- (Ammonium salt) $C_6H_3ClNO_2SO_3NH_4$.
Color and properties: White flaky crystals.
Solubility: Soluble in water.
Derivation: Sulfonation of ortho-nitrochlorobenzene or sulfonation of chlorobenzene with subsequent mononitration.
Method of purification: Recrystallization.
Grades: Technical, 60 to 70% acid paste.
Containers: Wooden barrels.
Uses: For preparation of aniline 2:5-disulfonic acid and ortho-nitroaniline-para-sulfonic acid.
Railroad shipping regulations: None.*

Nitrochlorobenzenesulfonic Acid, Para- $C_6H_3NO_2ClSO_3H$.
Color and properties: White flaky crystals.
Very soluble in water.
Derivation: Sulfonation of para-nitrochlorobenzene.
Method of purification: Recrystallization.
Grades: Technical, 60 to 70% acid paste.
Containers: Wooden barrels.
Uses: Manufacture of para-nitroaniline-ortho-sulfonic acid.
Railroad shipping regulations: None.*

Nitrochlorobenzol. See Nitrochlorobenzene.

Nitrochloroform. See Nitrotrichloromethane.

Nitro-cotton. See Nitrocellulose.

Nitrocresolmethylether $C_6H_3CH_3NO_2OCH_3$.
Color and properties: Pale yellow crystals.
Constants: M.p. 8.5°C.; b.p. 274°C.
Soluble in methyl alcohol and ether.
Derivation: Methylation of nitrocresol with methyl-chloride. Care must be taken in handling methyl-chloride because of its fire hazard.
Method of purification: Distillation.
Grades: Technical.
Containers: Drums.
Uses: Dyes and other intermediates.
Railroad shipping regulations: None.*

8-Nitro-1-diazo-2-naphthol-4-sulfonic Acid $C_{10}H_5N_3SO_6$.
Color and properties: Yellow solid.
Soluble in water.
Derivation: Diozatization of 1-amino-2-hydroxynaphthalene-4-sulfonic acid and subsequent nitration.
Grades: Technical.
Containers: Barrels.
Uses: Dyes.
Fire hazard: None when wet.
Railroad shipping regulations: None(?)*

Nitrodichlorobenzene $C_6H_3NO_2Cl_2$.
Color and properties: Pale yellow, crystalline mass.
Constants: Sp.gr. 1.669; m.p. 53° to 54°C.; b.p. 266°C.
Insoluble in water; slightly soluble in alcohol; soluble in ether.
Derivation: Nitration of para-dichlorobenzene.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Barrels or steel drums.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Manufacture of dichloroaniline and para-chloro-ortho-nitrophenol.

Railroad shipping regulations: None.*

Nitrodracylic Acid. See Nitrobenzoic acid, para-.

Nitrogen N_2.

Color and properties: Colorless, odorless, tasteless gas constituting about four-fifths of the air; colorless liquid.

Constants: Sp.gr. (gas) 0.96737; (liquid) 0.804; (solid) 1.0265; m.p. —210.5°C.; b.p. —195.5°C.

Soluble in water; slightly soluble in alcohol.

Derivation: From liquid air by distilling off the oxygen.

Impurities: Argon and other "rare gases" of the air; oxygen.

Grades: Technical.

Containers: Steel cylinders.

Uses: Production of nitric acid, cyanamide, cyanides and nitrides of metals.

Railroad shipping regulations: Green gas label.

Nitrogen Fixation. A term applied to methods of abstracting nitrogen from the air in commercial quantities and "fixing" it in some comparatively cheap and stable form so that use can be made of it either in agricultural or industrial operations.

Three methods have been developed for this purpose:

The arc process: In this process air is passed rapidly through a zone of exceedingly high temperature produced in an electric arc furnace. The gases formed are cooled, on leaving the furnace, from approximately 1,100° to about 50° C. by passing them through waste heat boilers, economizers and cooling towers. They are then led through an absorption system where, in the first tower of the series, the oxygen of the accompanying air reacts with the nitric oxide (NO) produced by the action of the arc to form nitrogen dioxide (NO_2). The gases are then passed through the remaining series of towers where they come in contact with water which absorbs the nitrogen dioxide forming nitric acid of 30% strength. Only about 80% of the nitrogen oxides are recovered in the form of nitric acid in actual practise. Of the remainder, some 17% are absorbed in a solution of soda ash which results in the production of sodium nitrite or a mixture of sodium nitrite and sodium nitrate, depending upon such operating conditions as temperature and degree of oxidation of the nitric oxide.

The cyanamide process: See Calcium cyanamide, derivation.

The direct synthetic ammonia process: In this process ammonia is formed by synthesis from its elements,—nitrogen and hydrogen. It is true that ammonia can be synthesized at atmospheric pressure, but the yield is too small for industrial practise. Consequently, commercial operation is now carried on, according to the different variation of the process, at pressures varying from 100 atmospheres to 900 atmospheres, and at temperatures from 450° to 700°C. Even at these conditions of pressure and temperature it is necessary to use a catalyst. It is believed that the catalysts used in most processes today are of the iron-base type to which certain substances called "promoters" have been added to expedite the synthesis. Various methods of conducting this process have been developed, each of which differs from the other, principally, in the temperature and pressure at which the operation is carried on. Those in commercial operation are as follows:

Haber process—200 atmospheres.
Claude process—900 atmospheres; 700° C.
Casale process—600 to 900 atmospheres; 500° C.
Fauser process—250 atmospheres; 550° to 600°C.
United States Fixed Nitrogen Research Laboratory process—300 atmospheres; 475°C.

Nitrogen Monoxide. See Nitrous oxide.

Nitroglycerin (Nitroleum; Trinitrin; Glyceryl trinitrate; Glonoin oil; Blasting oil; Trinitroglycerol) $CH_2NO_3CHNO_3CH_2NO_3$.

Color and properties: Pale yellow, thick, inflammable, explosive liquid.

Constants: Sp.gr. 1.6009; freezing-point 13.1°C.; explosion-point 260°C.

Soluble in alcohol and ether; slightly soluble in water.

Derivation: By dropping glycerol through cooled, mixed acid and stirring, followed by repeated washing with water.

Grades: Technical; U.S.P.

Containers: Tin cans.

Uses: Explosive; production of dynamite and other explosives; medicine.

Fire hazard: Dangerous.*

Railroad shipping regulations: Cannot be shipped by freight or express.

Nitrohydrochloric Acid. See Aqua regia.

Nitrohydroxybenzoic Acid, Asymmetric, Meta-. See Nitrosalicylic acid, meta-.

Nitroleum. See Nitroglycerin.

Nitrolignin. A pyroxylin or nitrocellulose said to be made from woody fiber.

Nitrolim. See Calcium cyanamide.

Nitromannite (Nitromannitol) $C_6H_8(NO_3)_6$.

Color and properties. Needles. Very sensitive and highly explosive. Liable to spontaneous decomposition.

Insoluble in water.

Derivation: By the action of mixed acid on mannitol, the product being washed, dried, dissolved in alcohol or ether and recrystallized.

Uses: Explosives (substitute for mercury fulminate).

Railroad shipping regulations: High explosive.

Nitromannitol. See Nitromannite.

Nitro-meta-diaminoanisole $C_6H_2NO_2(NH_2)_2OCH_3$.

Color and properties: Yellow, crystalline powder.

Constants: M.p. 162°C.

Soluble in water and alkaline solutions.

Derivation: By acetylation of meta-diaminoanisole followed by nitration in sulfuric acid solution, and removal of the acetyl groups.

Method of purification: Recrystallization.

Grades: Technical.

Containers: Tins.

Uses: Dyeing hair, fur, feathers, etc.

Railroad shipping regulations: None.*

Nitro-meta-diaminophenetole $C_6H_2NO_2(NH_2)_2OC_2H_5$.

Color and properties: Yellow, crystalline powder.

Soluble in water and alkaline solutions.

Derivation: By acetylation of meta-diaminophenetole, followed by nitration in sulfuric acid solution and removal of the acetyl groups.

Method of purification: Recrystallization.

Grades: Technical.

Containers: Tins.

Uses: Dyeing hair, fur, feathers, etc.

Railroad shipping regulations: None.*

Nitro-meta-toluenediamine. A misnomer for nitro-meta-toluylenediamine.

Nitro-meta-toluylenediamine $C_6H_2NO_2(NH_2)_2CH_3$.

Color and properties: Large yellow, crystalline needles with a violet sheen.

Constants: M.p. 154°C.

Soluble in hydrochloric acid, hot water and hot acetone; very slightly soluble in alcohol and ether; insoluble in chloroform and carbon bisulfide.

Derivation: By nitrating diacetyltoluenediamine with cold fuming nitric acid, heating with an excess of strong sodium hydroxide solution and washing with water.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Crystallization.
Grades: Technical.
Containers: Tins.
Uses: Dyeing hair, fur, feathers, etc.
Railroad shipping regulations: None.*

Nitromuriatic Acid. See Aqua regia.

Nitron (Diphenylendoanilohydrotriazole) $CN_4(C_6H_5)_3CH$.
Color and properties: Lemon-yellow, fine crystalline needles.
Soluble in chloroform, acetone and acetic acid ester; slightly soluble in ether and alcohol.
Derivation: Triphenylaminoguanidine (prepared from thiocarbanilide and phenylhydrazine), is heated with formic acid, the product diluted with much water, filtered, and precipitated with ammonium hydroxide. The product is dissolved in chloroform, the solution concentrated and allowed to crystallize.
Grades: Pure.
Containers: Glass bottles.
Uses: Reagent for the detection of the nitrate ion (NO_3) in very dilute solutions.
Railroad shipping regulations: None.*

Nitronaphthalene, Alpha- $C_{10}H_7NO_2$.
Color and properties: Yellow crystals.
Constants: Sp.gr. 1.331; m.p. 61°C.; b.p. 304°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the action of a mixture of nitric and sulfuric acids on finely ground naphthalene.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; kegs.
Uses: Dyes; naphthylamine.
Railroad shipping regulations: None.*

1-Nitronaphthalene-5-sulfonic Acid (Laurent's alpha acid) $C_{10}H_6(NO_2)(SO_3H)$.
Color and properties: Pale yellow needles.
Soluble in water, alcohol and ether.
Derivation: By sulfonating nitronaphthalene with a mixture of chlorohydrin and sulfuric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Nitro-ortho-aminophenol, Para- $C_6H_3OHNH_2NO_2$.
Color and properties: Brownish-yellow.
Constants: Yellow-brown leaflets containing water of crystallization melting at 80° to 90°C.; anhydrous melts at 142° to 143°C.
Soluble in acid.
Derivation: From Dinitrophenol.
Method of purification: Recrystallization from hydrochloric acid.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Nitro-ortho-anisidine, Para- $C_7H_8N_2O_3$.
Color and properties: Yellow crystalline solid.
Constants: Freezing point (commercial) 107°C.
Derivation: Ortho-anisidine is acetylated, then nitrated, and saponified by heating with 70% sulfuric acid. The resulting mixture of 4- and 5-nitro-ortho-anisidines is separated by crystallization from 40% sulfuric acid.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Nitro-ortho-toluidine, Para- $C_7H_8N_2O_2$.
Color and properties: Yellow crystalline solid.
Constants: M.p. 107 to 109°C.
Soluble in alcohol and ether.
Derivation: From ortho-toluidine by nitration.
Method of purification: Crystallization.
Grades: Technical.
Containers: Barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Nitro-para-cresol $C_6H_3CH_3OHNO$.
Color and properties: Yellow flat needles.
Constants: M.p. 33.5°C.
Soluble in alcohol and ether and slightly soluble in water.
Derivation: Diazotization and hydrolysis of para-toluidine nitrate.
Method of purification: Distillation.
Grades: Technical.
Containers: Drums.
Uses: Dyes and other intermediates.
Railroad shipping regulations: None.*

Nitro-para-toluidine, Meta- $C_7H_8N_2O_2$.
Color and properties: Orange-red crystals.
Constants: M.p. 114° to 115°C.
Soluble in alcohol and concentrated sulfuric acid.
Derivation: From acetyl para-toluidine by nitration.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Nitrophenetole, Para- $NO_2C_6H_4OC_2H_5$.
Color and properties: Crystallizes in prisms.
Constants: M.p. 58°C.; b.p. 283°C.
Soluble in alcohol and ether.
Derivation: This is prepared by ethylation of para-nitrophenol with ethyl chloride.
Method of purification: May be recrystallized from alcohol.
Grades: Technical.
Containers: Drums.
Uses: Dyes and other intermediates.
Railroad shipping regulations: None.*

Nitrophenol $NO_2C_6H_4OH$. (a) Ortho-; (b) Meta-; (c) Para-.
Color and properties: (a) Light yellow crystals. (b) Yellow crystals. (c) Colorless or yellowish crystals.

Constants:	(a)	(b)	(c)
Specific gravity	1.657	1.485	1.479
Melting-point	44.27°C.	95.3°C.	113.8°C.
Boiling-point	214°C.	194°C.	....

Soluble in alcohol and ether; slightly soluble in water.
Derivation: (a) and (c) From phenol and dilute nitric acid, and separation by steam distillation, ortho-nitrophenol being volatile and para-nitrophenol not. (b) Meta-nitroaniline dissolved in dilute sulfuric acid is diazotized. The diazo solution is decomposed by boiling with dilute sulfuric acid, cooled, extracted with ether and the latter evaporated. (c) By diazotization of sulfanilic acid, after which the diazo compound is treated with warm dilute nitric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: (c) 185 lb. barrels; paste, 450 lb. barrels.
Uses: (b) Manufacturing the rhodamine dyes. (c) Production of phenacetin, phenolphthalein, etc.
Railroad shipping regulations: None.*

Nitrophoskas IG.
A proprietary brand of German three-plant-food fertilizer stated to consist of a highly concentrated material made from solution mix of ammonium nitrate, diammonium phosphate, and potassium chloride or sulfate.
Color and properties: Grayish-white, granular salt.
Soluble in water.
Derivation: As above.
Grades: No. 1, 15% nitrogen, 30% phosphoric acid and 15% potash. About one-tenth of the nitrogen is in nitrate form, the balance in am-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

monia form, 27.51% phosphoric acid is water-soluble, 2.3% citric-soluble. No. 2, 16.5% nitrogen, 16.5% phosphoric acid and 20% potash. Slightly more than one-fifth of the nitrogen is in the nitrate form, the balance in ammonia form. Most of the phosphoric acid is water-soluble. No 3, 15.5% nitrogen, 15.5% phosphoric acid and 19% potash (from sulfate). Slightly more than one-fourth of the nitrogen is in the form of nitrate, the balance in ammonia form. Most of the phosphoric acid is water-soluble. No. 4, 15% nitrogen, 11% phosphoric acid and 26.5% potash. Slightly more than one-third of the nitrogen is nitrate, the balance ammonia. All of the phosphoric acid is water-soluble.
Containers: Paper-lined asphaltum-treated burlap sacks.
Uses: Fertilizer.
Railroad shipping regulations: None.*

Nitrosalicylic Acid, Meta- (Meta-nitrohydroxybenzoic acid, asymmetric) $C_6H_3COOHOHNO_2$.
Color and properties: Yellowish crystals.
Constants: M.p. 235°C.
Soluble in water and in alcohol.
Derivation: By the nitration of salicylic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; kegs.
Uses: Intermediates; azo dyes.
Railroad shipping regulations: None.*

Nitrosodimethylaniline, Para- $NOC_6H_4N(CH_3)_2$.
Color and properties: Green leaflets.
Constants: M.p. 87.8°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By action of nitrous acid on dimethylaniline.
Method of purification: Crystallization.
Grades: Technical.
Containers: 120 lb. barrels.
Uses: Production of methylene blue; vulcanization accelerator.
Railroad shipping regulations: None.*

Nitrosonaphthol (Naphthaquinoneoxime) $NOC_{10}H_6OH$.
(a) Alpha-nitroso-alpha-naphthol.
(b) Beta-nitroso-alpha-naphthol.
(c) Alpha-nitroso-beta-naphthol.
Color and properties: Yellow needles.
Constants: M.p. (a) 152°C.; (b) Decomposes at 194°C.; (c) 106°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By the action of nitrous acid on beta-naphthol. (b) From beta-naphthol by reacting with sodium nitrite and zinc chloride.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Nitrosonitric Acid. See Nitric acid, fuming.

Nitrosophenol, Para- C_6H_4OHNO.
Color and properties: Crystallizes in light brown leaflets which decompose at 124°C.
Constants: M.p. 124°C.
Soluble in alcohol, ether and acetone; moderately soluble in water.
Derivation: From phenol by action of nitrous acid in the cold.
Method of purification: None required.
Grades: Technical.
Containers: Steel barrels kept tightly covered.
Uses: Dyes.
Fire hazard: Fires instantly when small amounts of acid or alkali are dropped into it; if impure it sometimes explodes by self ignition; if ignited it burns explosive-like.*
Railroad shipping regulations: None shipped; for inter-plant transfer must be handled in tightly covered steel barrels.

Nitrostarch (Starch nitrate) $C_{12}H_{12}(NO_2)_8O_{10}$.
Color and properties: Orange-colored powder. Contains 16.5% nitrogen. Highly explosive.
Soluble in ether-alcohol.
Uses: Explosives.
Railroad shipping regulations: High explosive.

Nitrosyl chloride NOCl. One of the oxidizing agents in aqua regia.

Nitrotoluene $NO_2C_6H_4CH_3$ (Nitrotoluol; Methylnitrobenzene; Methylnitrobenzol).
Color and properties:
(a) Meta-: Yellow crystals.
(b) Ortho-alpha: Yellow liquid.
(c) Ortho-beta: Yellow crystals.
(d) Para-: Yellow crystals.

Constants:	(a)	(b)	(c)	(d)
Sp.gr.:	1.1570	1.650	......	1.2856
M.p.:	16°C.	—9.55°C.	—3.85°C.	51.4°C.
B.p.:	230°-231°C.	222.3°C.	......	237.7°C.

Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: (a) From meta-nitro-para-toluidine. Can be nitrated further to dinitrotoluene, only with greater difficulty, while ortho- and para-compounds are easily converted. (b), (c) and (d) From toluene by nitration and separation by fractional distillation.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: (a) and (c) No important use. (b) and (d) For production of toluidine, tolidine, fuchsine and various synthetic dyes.
Railroad shipping regulations: None.*

Nitrotoluene-ortho-sulfonic Acid, Para- $C_7H_7NO_5S$.
Color and properties: Crystallizes from water in pale yellow prisms.
Constants: M.p. 133.5°C.
Soluble in alcohol, ether and chloroform.
Derivation: From para-nitrotoluene by sulfonation with oleum.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Nitrotoluol. See Nitrotoluene.

Nitrotrichloromethane (Nitrochloroform; Chloropicrin; Chlorpicrin; Trichloronitromethane) CCl_3NO_2. A military poison gas used in the late war.

Nitrous Ether. See Ethyl nitrite.

Nitrous Oxide (Nitrogen monoxide; Laughing gas) N_2O.
Color and properties: Colorless, sweet-tasting gas; non-inflammable; condensable into a colorless liquid.
Constants: Sp.gr.: Gas 0.937; Liquid, 1.530. M.p.: Liquid, —102°C. B.p.: Liquid, —89.8°C.
Soluble in alcohol and concentrated sulfuric acid; slightly soluble in water.
Derivation: By heating a mixture of sodium nitrate and ammonium sulfate to 230°C. and collecting the gas over mercury or hot water.
Grades: Pure; U.S.P.
Containers: Steel cylinders.
Uses: Anesthetic in dentistry and surgery, either pure or mixed with oxygen.
Railroad shipping regulations: Green gas label.

Nitroxylene (Nitroxylol; Dimethylnitrobenzene; Dimethylnitrobenzol) (a) Nitro-ortho-xylene; (b) Nitro-meta-xylene; (c) Nitro-para-xylene. $C_6H_3(CH_3)_2NO_2$.
Color and properties: (a) Pale yellow, crystalline needles; (b) Yellow liquid becoming red-brown on exposure; (c) Pale yellow liquid becoming red-brown on exposure.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants:	(a)	(b)	(c)
Specific gravity	1.139	1.135	1.132
Melting-point	29°C.	2°C.	Liquid
Boiling-point	258°C.	246°C.	240°C.

Soluble in alcohol and ether; insoluble in water.
Derivation: By nitrating xylene, resulting in a mixture of the three nitroxylenes, consisting largely of the nitro-meta-xylene.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Nitroxylol. See Nitroxylene.

Nivenite. A massive variety of uraninite (q.v.) with indistinct crystallization. Color, velvet-black. It is more soluble than other varieties of uraninite.
Constants: Sp.gr. 8.01; hardness 5.5.

Nizin $Zn[C_6H_4(NH_2)SO_3]_2.4H_2O$. Zinc sulfanilate used in medicine as an astringent and antiseptic. Usually as a hypodermic injection in treatment of chronic gonorrheal urethritis. Unofficial.
Railroad shipping regulations: None.*

Nizolysol. Said to be a lysol preparation with a more agreeable odor than Lysol (q.v.).
Railroad shipping regulations: None.*

Noah's Ark. See Cypripedium.

Noble Laurel. See Laurus.

Noble Liverwort. See Liverwort.

Noble Metals. Gold, silver, mercury, platinum, palladium, iridium, rhodium, ruthenium and osmium.

Nogas. Trade name for a deep brown powder which is stated to prevent escape of destructive hydrogen fumes in hot pickling of iron and steel with sulfuric and muriatic acids. Containers: 300 lb. barrels.

Nohlite. See Samarskite.

Nonoic Acid, Normal. See Pelargonic acid.

Nonyl Alcohol.
Color and properties: Colorless liquid, peculiar rose odor. Used in perfumery (rose otto, jasmine and neroli oils).
Railroad shipping regulations: None.*

Nordhausen Acid. Fuming sulfuric acid of sp.gr. 1.86 to 1.90.

Norit. Trade name for a vegetable char used for the decolorization of sugar.

Norite. A rock composed of the minerals labradorite (q.v.) and hypersthene (q.v.).

Normal Heptane. See Heptane.

Normal Hexane. See Hexane.

Norwegian Saltpeter. See Calcium nitrate.

Noselite $Na_4(NaSO_4.Al)Al_2(SiO_4)_3$.
A complex mineral of the sodalite (q.v.) group. Can only be identified from haügnite (q.v.) by microchemical tests. Found in Germany and Cape Verde Islands.

Nosophen (Tetraiodophenolphthalein) $C_{20}H_{10}I_4O_4$.
Color and properties: Impalpable, yellowish-gray, powder, odorless, tasteless. Represents 61.7% iodine. Non-toxic.
Constants: M.p. 225°C.
Soluble in alkalis; difficultly soluble in alcohol, ether, chloroform and glacial acetic acid; insoluble in water and acids.
Derivation: Action of iodine on phenolphthalein solutions.
Grades: C.P.
Containers: Glass bottles.
Uses: Medicine (internal antiseptic, dusting powder in surgery, nasal and laryngeal affections, gall bladder radiography, unofficial).
Railroad shipping regulations: None.*

Nottingham White. See White, Cremnitz.

Noumeite. See Garnierite.

Novaculite. An exceedingly fine-grained quartzose rock, used as an abrasive. Occurs in Arkansas, Georgia, Massachusetts, North Carolina, Oklahoma and Tennessee.

Novargan (Silver proteinate).
Color and properties: Yellow, amorphous powder. Contains 10% silver. Silver is not precipitated from the solution by usual silver precipitants.
Soluble in water.
Grades: U.S.P.
Containers: 1 oz. bottles.
Uses: Medicine (astringent, bactericide, inflammation of mucous membrane, gonorrhea, unofficial).
Railroad shipping regulations: None.*

Novarsenobenzol-Billon. See Neoarsphenamine.

Novaspirin. See Methylenecitrosalicylic acid.

Novatophan. See 6-Methyl-2-phenylquinoline-4-carboxylicethyl ester.

Noviform (Tetrabromopyrocatechol bismuth). A yellow, insoluble powder used as a substitute for iodoform in surgical dressings (unofficial).
Railroad shipping regulations: None.*

Novocaine. See Aminobenzoyldiethylaminoethanol hydrochloride, para-.

Novocaine Base. See Aminobenzoyldiethylaminoethane, para-.

Novocaine Nitrate. See Aminobenzoyldiethylaminoethanol nitrate, para-.

Nuces Nucistæ. See Myristica.

Nuclein. A group of protein-containing substances having a neucleinic acid group in their structure. For some of the commercial nuclein preparations see Nuclein (from yeast), Nucleol, Nucleinic acid (from yeast); Nucleinic acid (animal), Sodium nucleinate, Sodium nucleate (from wheat); Ferrinol, Quinine nucleinate.

Nuclein (from yeast).
Color and properties: Grayish-white amorphous powder.
Soluble in alkaline solutions; sparingly soluble in water.
Uses: Medicine (bactericide, unofficial).
Railroad shipping regulations: None.*

Nuclein Mercurate. See Levurargyre.

Nucleinic Acid (Animal).
Color and properties: Yellow powder.
Soluble in alkalis; almost insoluble in water.
Uses: Medicine (bactericide, unofficial).
Railroad shipping regulations: None.*

Nucleinic Acid (from Yeast).
Color and properties: Grayish-white or white powder.
Soluble in alkalis; almost insoluble in water.
Uses: Medicine (bactericide, unofficial).
Railroad shipping regulations: None.*

Nucleol.
Color and properties: White powder. Pure nuclein.
Soluble in water.
Uses: Medicine (bactericide, unofficial).
Railroad shipping regulations: None.*

Nucleotinphosphoric Acid. See Solurol.

"Nulomoline." A proprietary glycerol substitute.

Nuremberg Red.
A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Nutgall. See Galls.

Nutgall, Chinese. Properties and uses similar to that of galls.

Nutmeg. See Myristica.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Nutmeg Butter. Expressed oil of nutmeg. See Myristica.

Nutmeg Flower. See Nigella sativa.

Nutmeg Oil (Myristica oil).
Color and properties: Thin, colorless or pale yellow, liquid, volatile oil; strong nutmeg odor; warm, spicy taste.
Chief known constituents: Myristicin; pinene; dipentene.
Constants: Sp.gr. 0.865 to 0.930; optical rotation +8° to +28°.
Soluble in alcohol, carbon bisulfide and glacial acetic acid.
Derivation: By distillation from nutmegs, Myristica fragrans.
Grades: Technical; U.S.P.
Containers: Glass bottles; barrels.
Uses: Medicine; flavoring; fine toilet soaps.
Railroad shipping regulations: None.*

Nux Moschata. See Myristica.

Nux Vomica (Quaker buttons; Poison nut; Dog button; Vomit nut).
Dried ripe seed of Strychnos nux vomica.
Habitat: Southern Asia and northern Australia.
Grades: Technical; U.S.P.
Containers: 70 lb. bags; powder, 200-250 lb. barrels.
Uses: Medicine; source of alkaloids, strychnine and brucine.
Railroad shipping regulations: None.*

Nysol. A product obtained by nitrating a solution of naphthalene in xylene. Used in the manufacture of low-freezing dynamites.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

O

Oak Bark.
Derivation: From Quercus robur (embracing Q. peduncularia and Q. sessiliflora as sub species).
Habitat: United States; Great Britain and Europe.
Grades: 25% tannin.
Containers: Extract: Wooden barrels.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Oakmoss Resin (Mousse de chêne).
Concrete oleoresin.
Derivation: Extracted from Evernia prumastii and E. furfuracea, lichens growing on oak, spruce and fruit trees, collected principally on French and Italian mountains bordering the Mediterranean.
Uses: Perfumery (important fixative).
Railroad shipping regulations: None.*

Oakum. Hemp fiber produced by untwisting rope, used for calking in ship- and boat-building. Usually impregnated with tar or pitch.

Obsidianite (Volcanic glass). Extrusive igneous rock which has been fused and cooled in an amorphous or nearly entirely amorphous condition, usually dark in color and having a vitreous appearance and fracture. Used in acid-concentrating plants on account of its acid-resisting properties.

Ocher, Antimony. See Stibiconite.

Ocher, Burnt. See Ochers.

Ocher, Scarlet. See Ochers.

Ochers.
A name given to various native earthy materials consisting, essentially, of hydrated ferric oxide, admixed with clay and sand in varying amounts and in impalpable subdivision. When carrying much manganese they grade into umbers (q.v.).
Ochers are either yellow, brown or red. Depending on the impurities present some ochers can be marketed after such simple preliminary treatment as drying, grinding and bolting; others, however, require more elaborate treatment, including calcining, in order to obtain the desired shade. The best reds are sometimes obtained by calcining the yellow varieties. They are called burnt ochers. Others, again, are obtained by calcining copperas or as a residue from the roasting of iron pyrites.
In general, the native yellows and browns are varieties of limonite (q.v.) and the native reds varieties of red hematite (q.v.). One variety of the red ocher is known as scarlet ocher. Ochers are valuable as pigments. Their valuation depends not only on depth of color but also on the amount of oil required as a vehicle.

Ochre. See Ochers.

Ochroite. See Cerite.

Octahedrite. A natural, crystallized titanium oxide. See Brookite and Rutile.

Octoic Compounds. See Caprylic compounds.

Octylic Compounds. See Caprylic compounds.

Oenanthal. See Oenanthol.

Oenanthic Acid (Heptoic acid; Normal heptylic acid; Oenanthylic acid) $CH_3(CH_2)_5COOH$.
Color and properties: Clear, oily liquid; unpleasant odor.
Constants: Sp.gr. 0.9212; m.p. —10.5° C.; b.p. 223° C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By oxidizing oenanthol with potassium bichromate and sulfuric acid.
Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Oenanthic Aldehyde. See Oenanthol.

Oenanthic Ether (Cognac oil; Oenanthylic ether) $CH_3(CH_2)_5COC_2H_5$.
Color and properties: Clear, colorless oil.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating oenanthic acid and ethyl alcohol in presence of sulfuric acid, and subsequent recovery by distillation.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Organic synthesis; manufacturing artificial cognac.
Railroad shipping regulations: None.*

Oenanthol (Oenanthic aldehyde; Heptanal; Heptoic aldehyde; Heptaldehyde; Oenanthal) $C_6H_{13}CHO$.
Color and properties: Highly refracting, volatile, colorless, oily liquid; penetrating, aromatic odor. Keep well stoppered.
Constants: Sp.gr. 0.850; b.p. 153° to 155° C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By the distillation of castor oil in vacuo, followed by fractional distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Heptylic alcohol; organic synthesis.
Railroad shipping regulations: None.*

Oenanthylic Compounds. See Oenanthic compounds.

Oil Black. See under Blacks, Mineral black.

Oil Blue. A violet-blue pigment consisting of copper sulfide. It is not very durable but when used in varnish, which protects it from the action of air, it is fairly permanent.

Oil Cakes. The residue obtained after the expression of vegetable oils from the oil-bearing seeds. These cakes are valuable both as cattle feed and fertilizer. When ground they are known as meal. For further data see under specific headings, such as Cottonseed cake, Cottonseed meal, etc.

Oil-Dag. A proprietary name for a compound stated to be a colloidal suspension of pure deflocculated graphite in oil. Used as a lubricant.
Railroad shipping regulations: None.*

Oil, Duty. See Rhodium oil.

Oil Gas. A gas formed by decomposing oil in retorts, purifying the gas and compressing it at pressures from 7 to 14 atmospheres. It is sometimes compressed to as high as 100 atmospheres. Blau gas (q.v.) and pintsch gas (q.v.) are oil gases. A typical oil gas will analyze about 31.3% illuminants, 2.4% carbon monoxide, 13.5% hydrogen, 46.5% methane, 3.9% ethane, 0.3% carbon dioxide, 1.1% nitrogen. Candle power, 38; B.t.u. 1,320.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Railroad carriage lighting; buoy lighting; industrial and domestic heating and lighting.
Railroad shipping regulations: Red gas label.

Oil Nut. See Juglans.

Oil Plant. See Ricinus.

Oilstone. A fine-grained whetstone on which oil is used. Found in Arkansas, Georgia, Indiana, Ohio.

Oil White. Usually mixtures of lithopone and white lead or zinc white (q.v.). It may also contain gypsum, magnesia, whiting, or silica. Used as a white-lead substitute.
Railroad shipping regulations: None.*

Oils. See under specific oil; e.g., Oil, acetone will be found under Acetone oil.

Old Fustic. See Fustic.

Oleates. Solutions of certain bases in oleic acid. The medicinal products are not pure chemical compounds, but merely compounds of the oxides or the alkaloids with oleic acid dissolved in an excess of the latter or in a fixed oil.

Olefiant Gas. See Ethylene.

Oleic Acid (Oleinic acid; "Red oil")
$C_{17}H_{33}COOH$.
Color and properties: Yellowish, oily liquid; lard-like odor; darkens on exposure to air.
Constants: Sp.gr. 0.8908; m.p. —10.5°C.; b.p. 222.4°C.
Soluble in alcohol, ether, chloroform, benzene, benzine, fixed and volatile oils; slightly soluble in water.
Derivation: From olein, the glyceride of oleic acid, the free fatty acid (mixed with other acids) is obtained by the Twitchell or some other splitting process. The fatty acids obtained are redistilled with steam or allowed to stand for a few days in shallow pans at about 30°C. when the palmitic and stearic acids crystallize. The magma is first pressed cold and then at 40°C. in bags in a hydraulic press; the liquid oleic acid separated forms the commercial "red oil."
Impurities: Linolic and other fatty acids, soap, etc.
Grades: Technical; U.S.P. (Sp.gr. 0.895 at 25°C).
Containers: 1, 5 lb. bottles; barrels.
Uses: Soap stock; manufacture of oleates; ointments; polishing compounds; oiling wool.
Railroad shipping regulations: None.*

Olein. The glyceride of oleic acid occurring in fats.

Oleinic Acid. See Oleic acid.

Oleo Oil.
Color and properties: Yellow liquid fat.
Derivation: Liquid olein and some palmitin obtained by cold-pressing tallow.
Grades: Technical.
Containers: Wooden barrels.
Uses: Making oleomargarine.
Railroad shipping regulations: None.*

Oleo-stearin. See Stearin.

Oleomargarine.
Derivation: Made from a mixture of natural or hydrogenated animal and vegetable fats colored with annatto or aniline dyes and sometimes flavored with butter.
Grades: Technical.
Containers: Boxes; tubs.
Uses: Butter substitute.
Railroad shipping regulations: None.*

Oleoresins.
Derivation: Mixtures of the resin and the essential oil of the plant from which they exude. They have a pungent taste and a peculiar odor and are sometimes referred to as balsams.
See Benzoin, Peru, Tolu and Storax balsams; see also various oleoresins below.

Oleoresin Capsicum.
Derivation: From the fruit of Capsicum fastigiatum (Cayenne or African pepper) by acetone extraction.
Soluble in alcohol and ether.
Grades: Technical; U.S.P.
Containers: Glass bottles; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Oleoresin Cubeb.
Derivation: From the fruit of Piper cubeba by alcohol extraction.
Soluble in alcohol and ether.
Grades: Technical; U.S.P.
Containers: Glass bottles; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Oleoresin Ginger.
Derivation: From rhizome, Zingiber officinale by acetone extraction.
Soluble in alcohol and ether.
Grades: Technical; U.S.P.
Containers: Glass bottles; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Oleoresin Pepper.
Derivation: By acetone extraction of the fruit of Piper nigrum.
Soluble in alcohol and ether.
Grades: Technical; U.S.P.
Containers: Glass bottles; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Oleum. The Latin name for oil, also applied to fuming sulfuric acid (q.v.).

Olibanum. See Gum thus.

Olibanum Oil (Frankincense oil).
Color and properties: Colorless or yellowish oil having an agreeably balsamic and faintly lemon-like odor.
Chief known constituents: Pinene; phellandrene; dipentene.
Constants: Sp.gr. 0.876 to 0.892 at 15°C.; optical rotation the oils formerly obtained were levogyrate up to —17°, those now obtained are dextrogyrate up to +29°; index of refraction, 1.472 to 1.482; acid value up to 3; ester value 5 to 16, after acetylation 46.7.
Solubility in alcohol: In 4 to 6 vols. of 90% alcohol, occasionally with slight turbidity.
Soluble in ether, chloroform, carbon bisulfide.
Derivation: By distilling gum thus.
Uses: Medicine.
Railroad shipping regulations: None.*

Oligoclase. See Feldspar.

Olive-kernel Oil.
Color and properties: Golden-yellow, non-drying liquid, with a greenish cast if pressed hot. When obtained by extraction the oil is dark green.
Constants: Sp.gr. 0.9184 to 0.9193; iodine number 87; saponification value 182.3 to 183.8.
Soluble in ether, chloroform and carbon bisulfide; sparingly soluble in alcohol; insoluble in water.
Derivation: From the kernels of the olive, Olea europaea, by pressing or extracting.
Grades: Technical.
Containers: Iron drums; tins.
Uses: Fuel; lubricant; soap; cooking; food.
Railroad shipping regulations: None.*

Olive Oil (Sweet oil; Florence oil; Luccu oil; Oleum olivae).
Color and properties: Pale yellow or greenish-yellow, fixed, liquid oil.
Chief known constituents: Olein; palmitin.
Constants: Sp.gr. 0.910 to 0.918; saponification value 188 to 196; iodine value 77 to 88.
Soluble in ether, chloroform and carbon bisulfide; sparingly soluble in alcohol.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By expressing the pulp of the fruit of the olive tree, Olea europea. The best oil comes from fruit not quite ripe. The crude oil is washed and filtered. The cake is subjected to further pressings and finally solvent extraction, a lower grade of oil being produced each time.
Impurities: Free fatty acids, sediment, water and adulterants.
Adulterants: Cottonseed, peanut, sesame and poppy oils.
Grades: Edible; commercial; sulfur oil (olive oil foots). The edible oil and also the commercial oil are obtained by expression, while the third grade by extraction, usually with carbon bisulfide. According to the chemists of the New York Produce Exchange the edible oil should not contain over 1½% free fatty acid, should be clear and sweet in odor and flavor. Commercial oil is of the same general character as the edible, except that the flavor is "off." The free fatty acids should not exceed 7%. Oil sold as green must be true green in color and must not turn brown when saponified with 20°Bé. caustic soda, 8 cc. of the solution being added to 10 grams of the oil. Olive oil foots should be green and should pass the soap color test specified for green olive oil. It has the same characteristics as olive oil except that the gravity tends towards higher limits. The free acid content is quite high, usually over 20% and often over 50%. The titer also sometimes runs a little higher.
Containers: Wooden barrels; tins; glass bottles.
Uses: As food (substitute for butter in Italy and other countries); in ointments, liniments, etc.; for manufacture of "Castile" soap; special textile soaps; lubricant; wool oil; tanning.
Railroad shipping regulations: None.*

Olive Oil Foots. See Olive oil.

Olive Spurge. See Mezereum.

Olivenite $Cu_3(AsO_4)_2.Cu(OH)_2$ or $4CuO.As_2O_5.H_2O$.
Mineral of wide color range, various shades of olive-green, passing into leek, siskin, pistachio, blackish-green, sometimes liver, wood-brown, straw-yellow, grayish-white. Adamantine to vitreous luster, olive-green to brown streak. Contains 40.7% arsenic pentoxide, 56.1% cupric oxide, balance water.
Soluble in nitric acid. See also Libethenite, Wood copper and Wood arsenate.
Constants: Sp.gr. 4.1 to 4.4; hardness 3.
Occurrence: United States (Utah), England, Austria, Hungary, Russia, Chile.

Oliver's Bark (Black sassafras).
Dried bark of Cinnamom oliveri.
Habitat: New South Wales, Queensland.
Used as a substitute for cinnamon in Australia.

Olivine.
The intermediate product in a group of silicate minerals consisting of ortho-silicates of magnesium, calcium, iron and manganese. The varieties of this group are:
Monticellite: $CaMgSiO_4$. Colorless to gray. Sp.gr. 3.03 to 3.25.
Forsterite: Mg_2SiO_4. White, greenish or yellowish. Sp.gr. 3.21 to 3.33.
Chrysolite (Olivine): $(MgFe)_2SiO_4$. Usually olive-green, but sometimes grayish-green, grayish-red, yellowish-brown or red. Sp.gr. 3.26 to 3.441. Hardness 6.5 to 7. Precious olivine or peridot is pale yellow-green and transparent. It is used as a gem stone.
Fayalite: Fe_2SiO_4. Color ranges from yellow to black. Sp.gr. 4.32.
Knebelite: $(FeMn)_2SiO_4$. Sp.gr. 4.1.
Tephroite: Mn_2SiO_4, sometimes with some zinc. Red to ash-gray. Sp.gr. 4.1.
Occurrence: Monticellite; United States (Arkansas), Italy. Forsterite; United States (Massachusetts), Italy. Fayalite; United States (Yellowstone Park, Massachusetts), Italy, Ireland. Knebelite; Ireland, Sweden. Tephroite; United States (New Jersey), Sweden, Australia. Chrysolite; United States (Vermont, New Hampshire, North Carolina, Virginia, Pennsylvania, Arizona, New Mexico), Canada, Levant, Egypt, Italy, Germany, Sweden, Norway, Sicily, Hawaii, Azores.

Omal. See Chlorophenols.

Omega-chlorotoluene. See Benzyl chloride.

Omega-chlorotoluol. See Benzyl chloride.

Omnopon. See Pantopon.

Omorol (Silver protein).
Color and properties: Yellow powder. Contains 10% silver.
Soluble in physiological saline solution, insoluble in water.
Uses: Medicine (antiseptic, astringent, inflammation of mucous membrane, wounds, ulcers, dusting agent in diphtheria, unofficial).
Railroad shipping regulations: None.*

Onion Oil.
Color and properties: Yellowish liquid; penetrating odor.
Chief known constituent: Allylpropylbisulfide.
Constants: Sp.gr. 1.035 to 1.045; optical rotation −5°.
Soluble in ether, chloroform and carbon bisulfide.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Flavoring.
Railroad shipping regulations: None.*

Onion's Alloy. See table under Fusible metals.

Onefrite $Hg(S,Se)$.
Metallic blackish-gray mineral, blackish-gray streak. Resembles Chalcocite (q.v.).
Constants: Sp.gr. 7.6 to 8.1; hardness 2.5.
Occurrence: United States (Utah), Mexico.

Onyx. A form of silica or quartz (q.v.), essentially a chalcedonic silica. Contains differently colored bands (black and white, red and white) like agate (q.v.) but the bands are straight and the layers in even planes. See also Sardonyx. Used for cameos. Much of the commercial onyx has been artificially colored.

Opal.
A form of native hydrated silica containing up to 13% water (usually 3 to 9%). It may be transparent to opaque, of vitreous, dull or pearly luster and varied in color (yellow, red, brown, green, gray, blue) or colorless with varied internal color reflections. The play in color has been attributed to the presence of microscopic cavities but another and later theory is the presence of thin curved lamellae of opal with refractive index differing by 0.1 from that of the mass.
Constants: Sp.gr. 1.9 to 2.3, (purest) 2.1 to 2.2; hardness 5.5 to 6.5.
Varieties:
Precious Opal (Noble). The finest variety. Vivid iridescent delicate colors.
Fire Opal. Honey-yellow to hyacinth-red colors.
Milk Opal. Milk-white to yellowish, greenish, bluish.
Resin Opal. Resinous luster, ocher to honey yellow.
Girasol. Bluish-white, reddish reflections in bright light, translucent.
Semi-opal. Brick red.
Hydrophane (Magic stone). Dead white and opaque when dry. Will absorb water and become translucent or transparent with colors.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Cachalong. Bluish to porcelain white, pale red or yellow; opaque.
Menilite. Dull gray and opaque.
Common Opal. Of no value for ornamental uses.
Opal-agate. Various colors; agate-like structure.
Wood-opal. A wood petrified with opaline silica; used as an ornamental stone.
Hyalite (Muller's glass). Colorless and transparent grading to white and translucent.
Siliceous Sinter (Fiorite). Varied; porous or compact white, gray or brown incrustations; opaque grading to translucent.
Floatstone. Gray or white; porous or full of cavities.
Pearl-sinter. Pearly fibers or threads.
Schaumopal. Porous African variety.
Geyserite. Deposits from geysers in a variety of structural forms; white or grayish in color.
Black Opal. Contains manganese oxide; brilliant colors.
Uses: Gem stone.

Opal-agate. See Opal.

Opianyl. See Meconin.

Opium.
Color and properties: More or less rounded, somewhat flattened masses; externally dark brown; internally dark brown, interspersed with lighter areas; strong, peculiar odor; bitter, somewhat acrid taste; somewhat plastic when fresh, becoming hard and brittle or tough on keeping. Official opium, for purposes other than the preparation of alkaloids or their salts, must yield, when dried and powdered, not less than 9.5% and not more than 10.5% anhydrous morphine. When used as a source for tincture or extract it must contain, when dry, not less than 7.5%.
Derivation: The air-dried, milky exudation obtained by incising the unripe capsules of Papaver somniferum L. or its variety album De Candolle (Fam. Papaveraceoe).
Commercial Varieties: (1) Asia Minor, Smyrna, Constantinople; (2) Macedonian; (3) Bulgarian; (4) Persian; (5) Indian; (6) Chinese; (7) Egyptian.
Uses: Medicine.
Railroad shipping regulations: None.*

Opium Gum. Crude opium.

Opium, Tincture of. See Laudanum.

Opoponax.
An oleo-gum-resin of reddish-yellow color, peculiar unpleasant odor; bitter, acrid taste.
Partly soluble in water.
Derivation: Dried exudation from wounded stem or root of Opopanax chironium, a plant closely allied to the parsnip, native to the Levant and growing wild in southern France, Italy and Greece.

Opoponax Resin. See Bissabol.

Orange Cadmium. See Cadmium sulfide.

Orange Flower Oil, Bitter. See Neroli oil.

Orange Flower Oil, Sweet. See Neroli oil, Portugal.

Orange Mineral. An oxide of lead corresponding to the same formula as red lead (q.v.). It differs from red lead in color and in some of its properties. It is manufactured by a different process and is a very fine orange-colored red lead.
Railroad shipping regulations: None.*

Orange Oils. See Orange peel oil, sweet; Orange peel oil, bitter; Orange flower oil, sweet; Orange flower oil, bitter.

Orange Oil, Terpeneless.
Concentration: About 35 to 50 times that of the ordinary orange oil.
Constants: Sp.gr. (about) 0.894; optical rotation, varies between wide limits according to the degree to which the terpenes have been extracted.
Solubility in alcohol: 50 parts per 100 parts of 70% alcohol.
Railroad shipping regulations: None.*

Orange Peel, Bitter (Curacao orange; Seville orange).
Derivation: Dried rind of the fruit of Citrus vulgaris.
Habitat: Northern India, Spain and West Indies; cultivated near the Mediterranean, Florida, California, etc.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Flavoring medicine.
Railroad shipping regulations: None.*

Orange Peel Oil, Bitter.
Color and properties: Similar to sweet orange peel oil (q.v.) excepting that the taste is bitter.
Chief known constituents: No data published; probably similar to that of sweet orange peel oil.
Constants: Sp.gr. 0.852 to 0.857 (usually 0.854 to 0.856) at 15°C.; optical rotation +89° to +94° (rarely +88°); refractive index 1.473 to 1.475.
Solubility in alcohol: In 7 to 8 vols. of 90% alcohol.
Derivation: Expressed from the peel of Citrus aurantium, L., subspecies amara.
Containers: Bottles; tins; copper flasks.
Uses: Flavoring; perfumery; medicine.
Railroad shipping regulations: None.*

Orange Peel Oil, Sweet (Portugal oil).
Color and properties: Yellow to yellowish-brown essential oil; mild, aromatic, not bitter taste; characteristic orange odor.
Chief known constituents: Limonene.
Constants: Sp.gr. 0.848 to 0.853 at 15°C.; optical rotation +95° 30′ to +98°; refractive index 1.473 to 1.475.
Solubility in alcohol: In 7 to 8 vols. of 90% alcohol (usually not clear).
Derivation: Expressed from the peel of Citrus aurantium, L., subspecies sinensis.
Containers: Bottles; tins; copper flasks.
Uses: Flavoring; perfumery; medicine.
Railroad shipping regulations: None.*

Orange Peel, Sweet (Sweet orange; Portugal orange; China orange).
Derivation: Rind of the fresh fruit of Citrus aurantium.
Habitat: Northern India, Spain and West Indies; cultivated near the Mediterranean, Florida, California, etc.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Flavoring; medicine.
Railroad shipping regulations: None.*

Orange Root. See Hydrastis.

Orangite. See Thorite.

Orchil (Archil; Orseille).
Color and properties: Dark brown-red paste or aqueous extract; a coloring matter obtained from various species of lichens, Roccella, Variolaria, Lecanora, etc.
Habitat: Azores, Canary Islands, Mediterranean region.
Chief constituents: Orcin and orcein.
Derivation: By macerating lichens with dilute ammonia and caustic soda; allowing to ferment, and adding sulfuric acid and salt.
Grades: Paste; extract.
Containers: Glass bottles.
Uses: Dyeing, particularly carpet yarns or to modify the effect of other dyes.
Railroad shipping regulations: None.*

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Orcin (Dioxytoluene; Methylresorcinol; Orcinol) $CH_3C_6H_3(OH)_2.H_2O$. 1:3:5.
Color and properties: White, crystalline prisms, becoming red in air; intensely sweet, unpleasant taste.
Constants: Sp.gr. 1.2895; m.p. (anhydrous) 107°C., (hydrous) 56°C.; b.p. 287° to 290°C.
Soluble in water, alcohol, and ether.
Derivation: By fermentation of various species of lichens (Roccella), and extraction.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (antiseptic, unofficial); reagent for certain carbohydrates.
Railroad shipping regulations: None.*

Orcinol. See Orcin.

Ordeal Bean. See Physostigma.

Oregon Grape Root. See Berberis.

Orient Yellow. See Cadmium sulfide.

Oriental Cashew-nut. See Semecarpus.

Oriental Sweet Gum. See Styrax.

Origanum Oils.
Essential oils obtained from various species of the genus Origanum indigenous to the Mediterranean countries. The botanical origin of the various oils cannot always be determined due to the large number of species and also, because commercial oils are not always distilled exclusively from a single species. All origanum oils contain carvacrol, together with cymene and sometimes linalool. For data on these oils see under geographical origin.
Physical characteristics:
Cyprus. Light yellow color but becomes darker on exposure to the air; sp.gr. 0.962 to 0.967 (15°C.); optical rotation inactive or slightly dextrogyrate up to +0° 20′; soluble in 2 to 3 vols. and more of 70% alcohol.
Greece. Sp.gr. 0.9351 (15°C.); optical rotation ±0°; refractive index 1.502; soluble in 4 vols. and more of 70% alcohol.
Sicily. Sp.gr. 0.920 (15°C.); optical rotation ±0°; soluble in 2 vols. of 80% alcohol.
Smyrna. Golden-yellow to brown color; mild linalool-like odor; sp.gr. 0.898 to 0.960 (15°C.); optical rotation —1° to —14°; refractive index 1.495 to 1.523; soluble in 2 to 3 vols. and more of 70% alcohol.
Syria. Samples possibly distilled from different species due to variable composition; sp.gr. 0.930 to 0.960 (15°C.); optical rotation —0° 50′ to +1° 35′, mostly dextrogyrate; soluble in 2 to 3 vols. of 70% alcohol.
Trieste. Golden-yellow when freshly distilled but becoming dark brown to blackish on exposure to the air. Pungent, thyme-like odor, biting, persistent taste; sp.gr. 0.94 to 0.98 (15°C.); optical rotation mostly undeterminable; soluble in 2 to 3 vols. of 70% alcohol.
Containers: Bottles; tins.
Uses: Flavoring.
Railroad shipping regulations: None.*

Oropon. A proprietary name for an enzyme bate used in the tanning industry.

Orphal (Bismuth beta-naphtholate).
Color and properties: Buff-colored to grayish-brown amorphous powder, odorless or faint beta-naphthol odor, tasteless. A bismuthbeta-naphthol compound of varying composition. Contains not less than 15% beta-naphthol and (upon ignition) from 73 to 78% bismuth oxide.
Partially soluble in mineral acids; almost insoluble in water, alcohol, chloroform, ether.
Derivation: By precipitating a solution of sodium beta-naphtholate with an acetic acid solution of bismuth nitrate in the presence of sodium hydroxide solution.
Uses: Medicine (astringent and antiseptic, enteritis).
Railroad shipping regulations: None.*

Orpiment (Arsenious sulfide; Arsenous sulfide; Yellow arsenic sulfide; Sulfoarsenious anhydride; Arsenic tersulfide; Arsenic trisulfide) As_2S_3.
A term applied equally to arsenic trisulfide whether obtained native as the mineral or artificially by chemical reaction. See Orpiment (Mineral) and Orpiment (Pigment).
Constants of the chemical: Sp.gr. 3.40; m.p. 310°C.; b.p. 700°C.

Orpiment (Mineral) As_2S_3.
Lemon-yellow mineral of resinous or pearly luster. Contains 61.0% arsenic, 39.0% sulfur. Occurs under the same conditions and in association with realgar of which it is often an alteration product.
Constants: Sp.gr. 3.4 to 3.6; hardness 1.5 to 2.
Occurrence: See Realgar.
Uses: Pigment; dyeing; depilatory. Its use now mostly displaced by the artificial product. See Orpiment (Pigment).

Orpiment (Pigment).
Although the pigment formerly consisted of the ground native mineral (See Orpiment, mineral), it is now also made extensively by means of chemical reaction; e.g., by the action of hydrogen sulfide upon a solution of arsenious chloride, or by subliming a mixture of arsenious acid and sulfur from a retort. Orpiment is a very bright yellow, but is not permanent on exposure to light and cannot be mixed with many other colors. It mixes well with oil and has good covering power. It is also known as royal yellow, king's yellow, arsenic yellow, yellow arsenic sulfide, arsenic trisulfide.
Railroad shipping regulations: None.*

Orris (Orris root; Irris).
Rhizome of Iris florentina, I. germanica, I. pallida.
Habitat: Central and Southern Europe.
Grades: N.F., Florentine, Verona. Whole, powdered, fingers.
Containers: Whole, 140 lb. bags and bags of variable size; powder, 200 lb. barrels; fingers, bags, packages, variable size.
Uses: Medicine (cathartic and emetic); tooth powders; perfumery.

Orris Oil.
Color and properties: Semi-solid, yellowish, fatty, volatile oil; slightly dextrogyrate.
Chief known constituents: Myristic acid, oleic acid and their methyl esters.
Constants: M.p. 44° to 50°C.; acid value 213 to 222.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the rhizome of Iris florentina.
Method of purification: Rectification.
Grades: Technical.
Containers: Copper flasks; glass bottles.
Uses: Perfumes; cosmetics.
Railroad shipping regulations: None.*

Orris Root. See Orris.

Orr's White. See Lithopone.

Orseille. See Orchil.

Orthite. See Allanite.

Ortho-compounds. Ortho-, meta- and para- compounds are substitution products derived from benzene in which the substituting radicals or groups are (constitutionally) placed in certain definite positions in the benzene nucleus. When two substituting groups (A and B) are in such position that they are attached to adjoining carbon atoms of the benzene nucleus (which contains six carbon atoms arranged in the form of a hexagon). B is the ortho position with respect to A, and the compound is an ortho-compound. If A and B are so attached that they have a third carbon atom of the nucleus between them, a meta-compound results. If A and B are attached to opposite atoms in the nucleus (two other carbon atoms between them) a para-compound results. These designations ortho-, meta-, and para- are usually omitted if but one of the three forms is in common usage. The ortho-compounds will be found under the name of the compound, as: Ortho-cresol, see Cresol, ortho-.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Orthocaine. See Methyl-meta-amino-para-hydroxybenzoate.

Orthoclase. See Feldspar.

Orthocoll. See Potassium guaiacol sulfonate.

Orthoform. See Methyl-meta-amino-para-hydroxybenzoate.

Orthoform, New. See Methyl-meta-amino-para-hydroxybenzoate.

Ortizon (Perhydrit; Peraquin).
Color and properties: White crystalline powder, odorless. A combination of hydrogen peroxide and urea. Contains 35% hydrogen peroxide.
Soluble in water.
Uses: Medicine (antiseptic, unofficial).

Osage Orange Extract.
Derivation: Bark of the shrub, native of United States.
Grades: 25% tannin.
Containers: Wooden barrels.
Uses: Textile industry; leather industry.
Railroad shipping regulations: None.*

Oscine. See Scopoline.

Osmic Acid Anhydride (Osmium tetroxide; Perosmic acid anhydride; Perosmic oxide) OsO_4.
Color and properties: Yellowish crystals; very pungent, disagreeable odor; vapor irritating when breathed; highly poisonous!
Constants: Sp.gr. 8.89; m.p. 20°C.; b.p. 100°C.
Soluble in water, alcohol and ether.
Derivation: By heating powdered osmium in air, or by treating it with nitric acid, aqua regia, or chlorine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; microscopic reagent; photography; incandescent gas mantles.
Railroad shipping regulations: None(?)*

Osmiridium. See Iridosmine.

Osmium Os.
Color and properties: Bluish, amorphous metal.
Constants: Sp.gr. 22.48; m.p. 2,500°C.
Soluble in nitric acid when finely divided; insoluble even in aqua regia when massive.
Derivation: Reduction of the oxide.
Grades: Technical.
Containers: Boxes.
Uses: Osmium salts; alloys.
Railroad shipping regulations: None.*

Osmium Tetroxide. See Osmic acid, anhydride.

Osmo-kaolin. A superior quality of kaolin, electrolytically purified.

Ossein. The soft protein substance of bone that remains after the removal of mineral matter.

Os Sepiae. See Sepia (Os sepiae).

Otaba Butter. A fat obtained from the fruit of Myristica otaba.

Otto of Rose Oil. See Rose oil.

Ottrelite. See Micas, brittle.

Ova-lecithin. See Lecithin.

Oxalic Acid $CO_2HCO_2H.2H_2O$.
Color and properties: Transparent, colorless crystals; poisonous!
Constants: Sp.gr. 1.653; m.p. 187°C.
Soluble in water, alcohol and ether.
Derivation: (a) By passing carbon monoxide into a hot concentrated solution of sodium hydroxide under pressure, and subsequent conversion of the sodium formate thus formed into the oxalate, followed by the conversion of the latter into the acid. (b) Sawdust treated with dilute acids or alkalis yields a solution containing oxalic acid or alkali oxalate.
Method of purification: Crystallization.
Grades: Technical (crystals and powder); C.P.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 5, 25, 50 lb. boxes; 110, 112, 180 lb. kegs; 300, 325, 350, 450, 700, 900 lb. barrels.
Uses: Chemicals (purifying agent in manufacture of glycerol, formic acid by reaction with glycerol, formic acid esters, pure dextrin by the hydrolysis of starch, purification of tartaric acid and to remove last traces of lime in manufacture of cream of tartar, glycolic acid); dyestuffs; intermediates; purifying stearin; bleaching straw; metal polishes; textile industries; ink and rust removers; tanning; analytical reagent; cleansing agent in brewing; precipitating agent for rare earths; blue inks; hematoxylin inks; wood cleansing compositions; process engraving and lithography; textiles.
Railroad shipping regulations: None.*

Oxalic Ether. See Ethyl oxalate.

Oxalyl-meta-phenylenediamine.
Color and properties: Gray.
Derivation: Meta-phenylenediamine and oxalic acid (condensation by heat).
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Oxalyl-para-nitroaniline.
Color and properties: Gray.
Derivation: Para-nitroaniline and oxalic acid (condensation with heat).
Grades: Technical.
Containers: Wooden barrels.
Uses: Intermediates.
Railroad shipping regulations: None.*

Oxammonium. See Hydroxylamine.

Oxammonium Hydrochloride. See Hydroxylamine hydrochloride.

Oxammonium Sulfate. See Hydroxylamine sulfate.

Oxgall. See Gall, ox.

"Oxi-Tan." The trade name for a tanning compound.

Oxidized Asphalts. See Blown asphalt.

Oxidized Oils. See Blown oils; also Blown asphalt.

Oxone. See Sodium peroxide.

Oxyacetic Acid. See Glycolic acid.

Oxybenzaldehyde, Ortho-. See Salicylic acid.

Oxybenzoic Acids. See Hydroxybenzoic acids.

Oxybutyric Acid, Beta-
$CH_3CH(OH)CH_2COOH$.
Color and properties: Viscid, yellow mass.
Soluble in water.
Derivation: By the interaction of acetoacetic acid and sodium amalgam.
Grades: Technical.
Containers: Wooden kegs.
Uses: Intermediates.
Railroad shipping regulations: None.*

Oxybutyric Aldehyde. See Aldol.

Oxychinaseptol. See Diaphtherin.

Oxyconiïne. See Conhydrine.

Oxycymol. See Carvacrol.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Oxydase. See Enzymes.

Oxydimercurous-ammonium Nitrate. See Mercurous oxide, black.

Oxyethylacetanilide. See Acetophenetidine.

Oxygen O_2.
Color and properties: Colorless, odorless, tasteless gas, liquefiable at —190°C. into a slightly bluish liquid, which is solidifiable at —227°C. It constitutes roughly one-fifth (by volume) of the air.
Constants: (Gas) Sp.gr. 1.10535; m.p. —227°C.; b.p. —182.5°C.
Soluble in molten silver; slightly soluble in water.
Derivation: (a) From liquid air by fractionation to remove the other gases of the air, by "heating" the liquid air with cold compressed air, by gradual expansion and cooling of compressed air. (b) By electrolysis of water.
Impurities: Nitrogen, carbon dioxide, water vapor, ammonia, argon, helium and other rare gases.
Grades: Technical; Pure; U.S.P.
Containers: Steel drums; cylinders or "gas-bottles."
Uses: (a) With hydrogen or acetylene for production of exceedingly hot flames for cutting and welding metals, including platinum. (b) For resuscitation in asphyxia and stimulation in various diseases. (c) In combustion to promote better utilization of fuel. (d) As a constituent of the explosive "oxyliquit." (e) Anesthesia.
Fire hazard: Dangerous.*
Railroad shipping regulations: Green (gas) label.

Oxymel (Mel acetatum).
A mixture of honey and vinegar, used in medicine as a vehicle of expectorant medicines and to impart flavor to drinks.

Oxy-meta-methoxyallylbenzene, Para-. See Eugenol.

Oxymethylacetanilide, Para-. See Methacetin

Oxymethylene. See Formaldehyde.

Oxynaphthyl-ortho-oxymetatoluylic Acid, Beta-. See Epicarin.

Oxynitrozanibeletti. Colloidal hydrated manganese peroxide used in medicine in the treatment of cholera. Unofficial.
Railroad shipping regulations: None.*

Oxynone. A trade name applied to a compound stated to be unsymmetrical diaminodiphenylamine used as a rubber antioxidant and age resister. It is a light brown powder with sp.gr. 1.29 and m.p. 125°C. Used in tread stocks and hot cured goods in general, except light or bright colored goods.

Oxyphenic Acid. See Pyrocatechol.

Oxyphenyl Benzylketone. See Benzoin.

Oxyquinoline Sulfate, Normal. See Quinosol

Oxysuccinic Acid. See Malic acid.

Oxytoluene Meta-, Ortho-, Para-. See corresponding cresol.

Oxytricarballylic Acid. See Citric acid.

Ozark White. A pigment combining the good qualities of standard zinc lead white and sublimed white lead. It is composed of approximately 60% zinc oxide and 40% lead sulfate.
Railroad shipping regulations: None.*

Ozokerite (Mineral wax; Fossil wax; Native paraffin).
Color and properties: A native, waxlike hydrocarbon mixture, yellow-brown to black or green in color, translucent when pure and having a greasy feel.
Constants: Sp.gr. 0.85 to 0.95; m.p. 55° to 110°C., usually about 70°C.
Soluble in benzine, benzene, turpentine, kerosene, ether, carbon bisulfide; slightly soluble in alcohol; insoluble in water.
Derivation: Found in nature in Utah, Austria, near the Caspian Sea, and Galicia.
Method of purification: Filtration.
Grades: Technical.
Containers: 80-100 lb. stands; bags.
Uses: Electric insulation; rubber filler; paints; leather polish; sealing wax; candles; lithographic and printing inks; electrotypers' wax; carbon paper; source of ceresin; floor polishes; impregnating furniture and parquet floor lumper; lubricating compositions; dolls and other toys; grease crayons; sizing and glossing paper; waxed paper; cosmetics; ointments; matrices for galvano-plastic work; textile sizings; waxed cloth; substitute for carnauba and beeswax.
Railroad shipping regulations: None.*

Ozokerite, Purified. See Ceresin.

Ozone. See Oxygen.

Ozone.
An allotropic form of oxygen, the physical constants of which are such as to require the formula O_3. Never obtained free from oxygen; probably never obtained in concentration greater than 1%, which mixture is a colorless or bluish gas, with characteristic odor; powerful bleaching action; oxidizes more rapidly than oxygen and promotes spontaneous combustion of many substances.
Constants: Sp.gr. (Gas) 1.658; m.p. (Liquid) —119°C.; b.p.: Decomposes at 270°C.
Soluble in water, oil of turpentine and oil of cinnamon.
Derivation: (a) By heating barium peroxide or potassium permanganate with strong sulfuric acid. This reaction should be performed with great caution. (b) By heating peroxides in a current of oxygen. (c) By passing air or oxygen through the blue zone produced by the discharge of high-tension electric currents.
Uses: Oxidizing agent; bactericide; bleaching waxes, oils, textiles, promoting production of peroxides, etc.

Ozonized Ether. An ethereal solution of hydrogen peroxide.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

P

Pack Fong. See German silver.

Packing-house Pitch. See Stearin and fatty acid pitches.

Packtong. See German silver.

Paint Clay. See under Clays.

Paint Fillers and Extenders.
Barytes, blanc fixe, barium carbonate, kieselguhr, china clay, asbestine, absestos, whiting, gypsum, terra alba, etc.

Paint Pigments. See Pigments.

Paint Remover (Varnish remover; Finish remover).
A preparation in liquid or paste form intended to be applied to objects coated with a dried film of paint, varnish, lacquer or enamel for the purpose of removing the finish. A uniform coating of the remover is generally applied to the surface under treatment, allowed to act for a longer or shorter time, and the softened or dissolved finish scraped, rubbed or washed away. A satisfactory remover will not affect the coated object and will leave it in good condition for refinishing. Removers containing volatile solvents usually contain non-volatile constituents intended to retard the rate of evaporation of the liquid, thereby prolonging its action. Typical solvents are: methanol, denatured ethyl alcohol, toluene, benzene, and ethyl acetate. 120° paraffin is mostly used as the retarder.

Paint Vehicles.
Linseed oil, soya bean oil, tung oil, fish oil, corn oil, benzine, benzene, turpentine, turpentine substitutes, etc.

Pakfong. See German silver.

Pale Cinchona. See Cinchona bark, loxa.

Pale Chrome. See Chrome yellows.

Palite. See Chloromethylchloroformate.

Palite, Super-. See Trichloromethylchloroformate.

Palladium Pd.
Color and properties: A malleable, ductile, silver-white metal; found in nature alloyed with gold or selenium. After heating to redness, when cold absorbs 370 times its volume of hydrogen. In sponge form it similarly absorbs 800 volumes at 100°C.
Constants: Sp.gr. 11.4 to 11.9; m.p. 1,550°C.
Soluble in nitric acid and aqua regia; insoluble in water. Palladium sponge: Soluble in hydrochloric acid.
Derivation: From palladium-ammonium chloride by ignition.
Impurities: Copper; iron.
Forms available: Sheet, plate, foil, wire, gauze, tubing.
Uses: Alloyed with gold, silver or copper in dentistry; for journal bearings, for springs and for balance wheels in watches; for coating silvered vessels; for manufacture of lancets and mirrors; palladium black and sponge in analytical chemistry; catalyst in hydrogenation; combustion of hydrogen and hydrocarbons with oxygen.
Railroad shipping regulations: None.*

Palladium Bichloride. See Palladium chloride.

Palladium Chloride (Palladous chloride; Palladium bichloride) (a) $PdCl_2$ (b) $PdCl_2.2H_2O$.
Color and properties: Dark brown, deliquescent powder or concretions.
Constants: M.p. (a) 501°C.
Soluble in water and hydrochloric acid.
Derivation: By solution of palladium in aqua regia and evaporation.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Medicine; analytical chemistry; photography on porcelain; manufacture of indelible inks; electroplating with palladium; detecting carbon monoxide gas; ingredient of wood cleaning compositions; ingredient of metal scouring compositions; starting point in the manufacture of photographic toning agents; removing iron mold from textile materials; textile mordant.
Railroad shipping regulations: None.*

Palladium Hydroxide, Colloidal. See Leptynol.

Palladous Chloride. See Palladium chloride.

Palm Butter (Palm oil; Palm grease).
Color and properties: A fixed, reddish-yellow fatty oil of butter-like consistency, faint violet odor, which is conveyed to the soap made from the oil.
Chief constituents: Free palmitic acid (12% in fresh oil to 55% in older oil), glycerides of palmitic and oleic acids, stearic acid.
Constants: Sp.gr. 0.920 to 0.927; m.p. 27° to 42.5°C.; iodine number 51.5; saponification number 202; Reichert number 0.5.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: By expression from the putrefied or fermented pulp of the fruit of a palm, Elaeis guineensis.
Habitat: West coast of Africa, West Indies, South America.
Method of purification: By fusing and heating to remove water, then heating to 100°C. and passing a finely divided stream of air through it. Chemical decolorization (hydrochloric acid and potassium bichromate) is used to a considerable extent.
Grades: Best oil comes from Lagos, Loam, Niger, South America, Liberia and Sierra Leone. "Soft oils" are those low in fatty acids, whereas "hard oils" are those high in fatty acids. The palm oil used in the tinplate industry always has cotton-seed oil and mineral oils mixed with it.
Containers: Wooden barrels; casks.
Uses: Manufacture of soaps and candles; emollient; coating iron plates, used in tin-plate industry; lubricants; coloring butter substitutes.
Railroad shipping regulations: None.*
See also: Palm-nut oil.

Palm Grease. See Palm butter.

Palm-kernel Oil. See Palm-nut oil.

Palm-nut Oil (Palm-kernel oil; Palm oil).
Color and properties: A yellowish, fatty oil, free of fatty acids when fresh; rapidly becoming rancid in air.
Chief constituents: Triolein (15 to 25%), triglycerides of stearic, palmitic and myristic acids (33%) and triglycerides of lauric, capric, caprylic and caproic acids (45 to 55%).
Constants: Sp.gr. 0.952; m.p. 26° to 30°C.; iodine number 13.4 to 13.6; saponification number 247.6.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: By crushing the nuts of Elaeis guineensis and pressing, or extracting with solvents.
Method of purification: Filtration.
Grades: Crude; refined.
Containers: Wooden kegs.
Uses: Manufacture of soaps and chocolate products; pharmacy; margarine manufacture, coloring butter substitutes; candles; illuminant; cutting tool lubricant; coating iron plates used in the tin plate industry to protect plates until dipped in the molten tin; cosmetics; softening and finishing cotton goods.
Railroad shipping regulations: None.*
See also Palm butter.

Palm Oil. See Palm butter and Palm-nut oil.

Palma Christi. See Ricinus.

Palmarosa Oil (Indian grass oil; Rusa oil; Indian geranium oil; Turkish geranium oil).
Color and properties: Colorless or light yellow, volatile oil, occasionally colored green by copper. Pleasant rose-like odor.
Chief known constituent: Geraniol.
Constants: Sp.gr. 0.887 to 0.90 (15°C.); optical rotation variable, some are slightly dextrogyrate, others slightly levogyrate, others inactive, +6° to −3°, average between +1 and −2°; refractive index 1.472 to 1.476; acid value 0.5 to 3.0; ester value 12 to 48, after acetylation 226 to 274.
Solubility in alcohol: 74.8 to 94.8% geraniol content in 1.5 to 3 vols. and more of 70% alcohol; higher geraniol content in 3 to 4 vols. and more of 60% alcohol.
Derivation: By distilling Cymbopogon martini, var. motia, found in India.
Adulteration: Kerosene, cocoanut oil, gurjun balsam oil, cedar oil, and turpentine are often used for this purpose. Their presence is indicated by the insolubility of the oil in 70% alcohol.
Uses: Perfumery.
Railroad shipping regulations: None.*

Palmetto.
Derivation: From Sabal serrulata, native in Florida and Georgia.
Grades: 25% tannin.
Containers: Wooden barrels.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Palmitic Acid (Palmitinic acid; Cetylic acid) $C_{16}H_{32}O_2$.
Color and properties: White crystals.
Constants: Sp.gr. 0.8465; m.p. 63.4°C.; b.p. 138° to 139°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From spermaceti by saponification.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Starting point in manufacture of various metallic palmitates.
Railroad shipping regulations: None.*

Palmitic Acid Cetyl Ester. See Cetin.

Palmitic Alcohol. See Cetyl alcohol.

Palmitin. See Tripalmitin.

Palmitinic Acid. See Palmitic acid.

Pan Scale.
A product which settles out during the crystallization of salt from brine. It is composed, chiefly, of calcium sulfate but also contains some sodium chloride and various mineral impurities.
Uses: Under the name of "salt lick" it is sold for feeding to cattle in order to supplement the mineral content of their food. Also used as a fertilizer.

Panama Bark. See Quillaja.

Panax. See Ginseng.

Pancake Plant. See Mallow leaves.

Pancreatin. A substance containing enzymes, principally amylopsin, trypsin and steapsin.
Color and properties: Cream-colored amorphous powder; characteristic odor; acts upon starch and proteins.
Soluble in water; insoluble in alcohol.
Derivation: Pancreas gland is extracted by macerating with chloroform, water, dilute boric acid, glycerol, or alcohol, filtered and evaporated.
Grades: U.S.P.
Uses: Medicine as an emulsifying agent and as a ferment.
Railroad shipping regulations: None.*

Pandermite. See Colemanite.

Pantopon (Omnopon). A proprietary name for a product stated to be a mixture of the hydrochlorides of all opium alkaloids. Contains 50% of anhydrous morphine hydrochloride. Used in medicine. Stated to be more serviceable than opium since it can be given hypodermically and is more actively narcotic in proportion to its poisonous properties than morphine. Toponal is a similar combination.
Railroad shipping regulations: None.*

Papain (Papayotin; Vegetable pepsin).
Derivation: An enzyme similar to pepsin, the concentrated active principal of the juice of the fruit and leaves of Carica papaya.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Papaver (Poppy heads; Poppy capsules).
Derivation: Capsules and seeds of Papaver somniferum.
Habitat: Europe and Asia.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Papaverine $(OCH_3)_2C_6H_3CH_2NC_5H_2C_4H_2(OCH_3)_2$.
Color and properties: White crystalline alkaloid; poisonous!
Constants: M.p. 147°C.
Soluble in chloroform and hot benzene; slightly soluble in alcohol and ether; insoluble in water.
Derivation: From opium.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine, as such or as the hydrochloride which is soluble in water.
Railroad shipping regulations: None.*

Papaw (Carica; Pawpaw; Papaya).
Derivation: Leaves of Carica papaya.
Grades: Technical.
Containers: Bags.
Uses: Manufacture of carpaine and papaine; digestant.
Railroad shipping regulations: None.*

Papaya. See Papaw.

Papayotin. See Papain.

Paper Clay. See under Clays.

Paper Pulp.
Cellulose fibers are the basis of paper. They were formerly prepared from linen and cotton rags exclusively but, although still so prepared for certain fine grades of paper, the main source of cellulose fibers for paper is now wood, especially spruce.
The cellulose fibers from wood are used mainly in two forms: (1) as ground wood, which is merely finely divided wood without purification; (2) in the form of chemical pulp, of which

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

there are three kinds: (a) pulp from the soda process, made from chipped wood by freeing it from the non-cellulose portion by boiling it with a solution of caustic soda; (b) pulp from the sulfite process, made from chipped wood by freeing it from the non-cellulose portion by boiling it with what is known in the paper industry as "acid," which is a solution of calcium bisulfite containing free sulfur dioxide; (c) pulp from the sulfate process, which is a modification of the soda process differing from it in that in the soda recovery system the loss of soda is made up by the addition of sodium sulfate instead of by the addition of soda ash. The greatest application of the sulfate process today is in the making of what are known as Kraft papers. Kraft paper is an exceedingly strong tough paper, ideally suited for wrappings and bags. It is not bleached, having a natural brown color which is characteristic of this variety of paper. Paper pulp finds wide application as a raw material in the production of rayon and other nitrocellulose products.

Papier-maché.

A tough, plastic material made: (a) From paper pulp admixed with size, paste, oil, resin or other substances; (b) from sheets of paper glued and pressed together.

Uses: Molded into boxes, trays, utensils, architectural ornaments and the like.

Railroad shipping regulations: None.*

Paprika. A sweetish condiment made from common pepper, much used by Hungarians.

Para-compounds. For definition of para-compounds see under Ortho-compounds.

Paracotoin $C_{12}H_8O_4$. An extract from paracoto bark used in medicine in the treatment of cholera. Unofficial.

Paradise Plant. See Mezereum.

Paradise-seed Oil. See Grains of paradise oil.

Paradise Tree. See Simaruba bark.

Paradow. Proprietary name for a para-dichlorobenzene.

Parafactis. See Factis.

Paraffin. See Paraffin wax.

Paraffin, Native. See Ozokerite.

Paraffin Oil. See Paraffin oils.

Paraffin Oil, American.

A name used in the British Empire for American kerosene.

Paraffin Oil, White. Liquid petrolatum (q.v.).

Paraffin Oils.

Lubricating oils made by the dry distillation method. The color range is from pale yellow, through yellowish-brown to reddish-brown to dark green but it is customary to decolorize them. In certain countries and localities kerosene is known as paraffin oil. Liquid petrolatum (q.v.) is also known as paraffin oil.

Constants: Gr. 20° to 30°Bé.; flash point (Cleveland open cup) 300° to 450°F.; cold test 0° to 40°F.; Saybolt viscosity 40 to 600 (70°F.).

Method of purification: Filtration.

Uses: Lubricant; leather dressing; medicine.

Railroad shipping regulations: None.*

Paraffin Scale. See Paraffin wax.

Paraffin Wax (a) Hard; (b) Soft (Paraffin scale; Paraffin; Ceresin).

Color and properties: White translucent, waxy, tasteless, odorless solid; consisting of a mixture of solid hydrocarbons chiefly of the methane series obtained from petroleum. Before purification it is known as paraffin scale.

Constants: Sp.gr. 0.880 to 0.915; m.p. 42° to 60°C.

Soluble in benzine, benzene, warm alcohol, chloroform, turpentine, carbon bisulfide and olive oil; insoluble in acids.

Derivation: (a) Paraffin oil is chilled and filter pressed to remove the heavy oil; the remaining solid is paraffin wax. (b) Treatment of ozokerite with sulfuric acid and bleaching.

Grades: Yellow crude scale; white scale; refined wax; U.S.P.

Containers: 100, 200 lb. kegs; 200 lb. cases (slabs).

Uses: Manufacture of paraffin candles, waxed paper, etc.; waterproofing wood, cork, etc.; impregnating matches; stearin candles; lubricants; preserving eggs; oil crayons; pharmacy (to stiffen ointments); surgery; stoppers for acid bottles; preservative covers for food products; electrical insulation; laundering preservative for railroad ties; phonograph records; floor polishes; waxed paper; extraction of perfumes from flowers; cosmetics; photography; antifrothing agent in sugar refining; packing tobacco products; coating interior of wine casks.

Railroad shipping regulations: None.*

Paraform. See Paraformaldehyde.

Paraformaldehyde (Paraform), constitution unknown $(CH_2O)_n.H_2O$.

Color and properties: White powder; slight odor of formaldehyde.

Constants: M.p. indefinite; sublimes.

Slightly soluble in water; almost insoluble in alcohol and ether.

Derivation: Polymerization of formaldehyde.

Grades: U.S.P.

Containers: 100 lb. galvanized drums.

Uses: Fumigant; preservative; synthetic resin; artificial horn and ivory; waterproofing animal and casein glues.

Railroad shipping regulations: None.*

Paragasite. See Hornblend.

Paragonite. See Mica.

Paraiba. See Simaruba bark.

Paralaudin. Diacetyldihydromorphine used in medicine as a substitute for diacetylmorphine (heroin). Unofficial.

Railroad shipping regulations: None.*

Paraldehyde $(CH_3CHO)_3$.

Color and properties: Colorless liquid. A polymerization product of acetaldehyde.

Constants: Sp.gr. about 0.99° at 25°C.; b.p. 120° to 125°C.; congeals above 9°C.

Soluble in water; miscible with alcohol, chloroform, ether, volatile oils.

Derivation: Action of hydrochloric acid upon acetaldehyde.

Containers: Well-closed, cool, protected by green light.

Uses: Medicine (to produce sleep).

Railroad shipping regulations: None.*

Paraldol $(CH_3CHOHCH_2CHO)_2$.

Color and properties: White crystals.

Constants: Sp.gr. 1.345 (15.6°/4°); b.p. 90° to 100°C. (in vacuo, under which conditions part of it is reconverted to aldol).

Soluble in water.

Containers: 85 lb. steel cans; 500 lb. barrels.

Railroad shipping regulations: None(?)*

Paramorphan (Dihydromorphine hydrochloride) $C_{17}H_{21}O_2N.HCl$.

Color and properties: White crystalline powder.

Soluble in water, slightly soluble in alcohol.

Uses: Medicine (substitute for morphine, unofficial).

Railroad shipping regulations: None.*

Paratophan. See 6-Methyl-2-phenylquinoline-4-carboxylic acid.

Parazone. A proprietary name for a rubber antioxidant and age resister. It is stated to be a white powder with sp.gr. 1.20 and m.p. 161°C., used especially in white or light-colored products which will be exposed to sunlight.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Pareira (Pareira brava; Abutua).
Derivation: Dried root of Chondrodendron tomentosum.
Habitat: Brazil and Peru.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Pareira Brava. See Pareira.

Parian Cement. See under Cements, structural.

Paris Black. See under Blacks.

Paris Blue. See Iron blues.

Paris Glue. See Glue and gelatin.

Paris Green. See Copper acetoarsenite.

Paris White. See Whiting.

Paris White, Cliffstone. See Whiting.

Paris Yellow. See Chrome yellows.

Parker's Cement. See under Cements, structural, Roman cement.

Parkesine. See Celluloid.

Park Lily. See Convallaria.

"Parlodion." The proprietary name for a shredded form of pure concentrated collodion.

Parmentine. The proprietary name of a compound used for sizing and finishing cotton, wool and silk, stated to be composed of gelatin, dextrin, glycerol, sodium sulfite and zinc sulfate, all of which are boiled together.

Parodyne. See Antipyrine.

"Par-O-Lac." The proprietary name for an impregnating compound.

Parraynite.
A proprietary rubber compound. It is said to have the property of affording protection from injury by X-rays.

Parrot Coal. See Cannel coal.

Parrot Green. See Copper acetoarsenite.

Parsley. See Petroselinum.

Parsley Camphor. See Apiole.

Parsley Oil.
Color and properties: A colorless or pale greenish-yellow liquid; strong odor of parsley.
Constants: Sp.gr. 1.07.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the fruit of Petroselinum sativum.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 5 lb. bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Partinum.
An alloy composed of tungsten, tin, copper, magnesium and aluminum. It has the same coefficient of expansion as glass and is used as the joining wire between filament leading-in wires of electric bulbs.

Partridge Berry Oil.
Wintergreen oil (q.v.).

Passiflora. See Passion flower.

Passion Flower (May-pop; Passiflora).
Dried flowering and fruiting top of Passiflora incarnata.
Habitat: Southern United States.
Uses: Medicine (nerve sedative).
Grades: N.F.

Pasque Flower. See Pulsatilla.

Patchouli Alcohol $C_{15}H_{26}O$. A solid deposited by Patchouli oil on standing.

Patchouli Oil.
Color and properties: Brownish-yellow, thick, liquid, volatile oil; fragrant, persistent odor, which improves with age.
Chief constituents: Patchouly alcohol, eugenol, cinnamic aldehyde, cadinene, para-camphor.
Constants: Sp.gr. 0.970 to 0.995; optical rotation −50° to −68°.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the leaves of Pogostemon patchouly.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 5 lb. bottles.
Uses: Perfumery (fixative); toilet preparations.
Railroad shipping regulations: None.*

Patent Green. See Copper acetoarsenite.

Patronite VS_4 or $V_2S_{2+n}S$.
Amorphous, dull mineral of black or very dark greenish-black color. Resembles asphaltum somewhat and consists of vanadium sulfide mixed with metallic sulfides.
Contains 19.53% vanadium, 1.87% nickel, 3.47% carbon, 58.79% sulfur. Found only in one deposit. See also Quisqueite.
Constants: Sp.gr. 2.5 to 2.71; hardness 3.5 and 2.5.
Occurrence: Peru.
Uses: Principal source of vanadium.

Pauly. See Rayon.

Paving Brick Clay. See under Clays.

Pawpaw. See Papaw.

Payta. See Krameria.

Peach-kernel Oil.
Color and properties: A pale yellow to red liquid; odor and taste similar to almond oil.
Constants: Sp.gr. 0.915; saponification value 191; iodine value 93 to 109.
Soluble in ether, chloroform and carbon bisulfide; partly soluble in alcohol.
Derivation: By expressing the blanched seeds of the peach, Prunus persica.
Grades: Technical.
Containers: Domestic, 50-55 lb. tins; 5, 10 lb. bottles; Imported, 112 lb. cases.
Uses: Nutrient similar to almond and olive oils; flavoring; medicine.
Railroad shipping regulations: None.

Peacock Copper Ore. See Bornite.

Peanut (Goober; Monkey nut; Ground nut; Earth nut).
The plant (Arachis hypogeae, Linn.): A legume, not a nut. Herbaceous annual dicotyledon. Roots fibrous, delicate and white. Root hairs usually in rosettes at base of side roots, rarely normal tip hairs. Nodules spherical, appearing when plant is 8 to 10 weeks old. Hypocotyl, 2 to 8 cm. long, sometimes slightly swollen at base during germination. Stems 30 to 80 cms. long, erect or prostrate, more or less hairy. Main stems branch early into cotyledonary branches. Cotelydons, low epigeal, green, with short thick petiole. Leaves, 8 to 12 cm. long, alternate, stipulate, pinnately compound. Flowers, yellow. The more terminale ones usually sterile, the lower ones fertile, more or less hidden, have short peduncles which elongate after fertilization. Calyx forms long stalk-like tube with one narrow lobe as lower lip. Corolla with large yellow, orange-striped standard, two small wings and tiny, incurved beaked keel. Stamens, ten, monodelphous, versatile. Pistil, monocarpous. Fruit, indehiscent legume, oblong, reticulated, thick, beaked, contains seeds.
Varieties: White Spanish, most common in commercial use in America. Plant 20 to 30 cms. tall, heavy foliage, small pods which contain seeds. Usually two well-rounded seeds to a pod.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Seed coats pink to red. Also Red Spanish, Tennessee Red, Virginia Bunch, Jumbo Spanish, North Carolina Runner.

The hulls: The fruit of the peanut plant which contains the seeds.

Color and properties: Cream-white to gray to dark brown depending upon variety. Composed mostly of cellulose. Contains pentose and some tannin and oils. Odorless, no taste, crisp. Contains whitish lining and considerable mucilaginous substances. Several varieties contain different amounts of carbohydrates, etc.

Derivation: By separation from the peanut plant either by hand or by mechanical picker.

Grades: One grade, different varieties.

Containers: Shipped in box cars in bulk.

Uses: Preparation of cellulose for paper stock and other cellulose products; manufacture of motor fuel; fertilizer; cattle feed; manufacture of furfural and xylose; base for synthetic plastics.

Railroad shipping regulations: None.*

The skins:

Color and properties: Pink to brownish in small Spanish; red, in red Spanish; dull red, in Tennessee red; light brown in jumbo. Bitter, acrid, alkaloidal taste. Little oil, small percentage carbohydrates, alkaloids, large amount of protein.

Chief constituents: Protein and pigment.

Derivation: See The plant.

Grades: Technical.

Containers: Cloth bags.

Uses: Cattle feed; source of protein; source of dyes; pigments.

Railroad shipping regulations: None.*

The seeds:

Color and properties: White to cream color; sweet taste, degrees of sweetness dependent upon varieties of peanuts; oily. Small white Spanish has sweetest taste and most oil. Contain the embryo or peanut hearts.

Chief constituents: Proteins; 40% oil average; small amount of carbohydrates.

Derivation: See the plant.

Grades: No. 1, best; No. 2, etc.

Containers: Bags; sacks.

Uses: Confections; roasted as a food; to make peanut butter by grinding in own oil; manufacture of oil by pressing.

Railroad shipping regulations: None.*

The oil (Arachic oil; Peanut oil; Earth-nut oil; Ground-nut oil; Katchung oil):

Color and properties: Yellow to greenish yellow. Typical non-drying oil of olive oil type.

Chief known constituents: Hypogaeic acid ($C_{16}H_{30}O_2$), lignoceric acid ($C_{24}H_{48}O_2$), arachidic acid ($C_{22}H_{40}O_2$), whence the taste, stearic acid ($C_{18}H_{30}O_2$), palmitic acid ($C_{16}H_{32}O_2$).

Constants: Sp.gr. 0.917 to 0.926; solidifying point 3°C.; saponification value 186 to 194; iodine number 88 to 98; Hehner's number 95.

Soluble in ether, alcohol, petroleum ether, benzine, carbon bisulfide and chloroform; insoluble in alkalis, but saponified by alkali hydroxides with formation of soaps; insoluble in water.

Derivation: By pressing ground peanut meats or by extraction with hot or cold solvents. Latter method more prominent.

Method of purification: Bleaching with fuller's earth or carbon. Hot pressed oil is frequently allowed to stand to deposit stearin (which it will do even at ordinary temperatures) and then filtered.

Grades: Oriental oil means oil imported from the Orient, differing to some extent from the domestic production. Oriental oil is stated to be "edible" when it contains less than 2% free fatty acids and is of a light yellow color. "Off grade" oil is much darker in color and contains over 2% free fatty acids. The New York Produce Exchange chemists define "crude" peanut oil as oil in which the free fatty acids are below 2% and moisture and solid impurities below 0.5%. "Prime crude" is oil that will yield "prime yellow refined" peanut oil on treatment with caustic soda. Refined peanut oil is graded as "choice," "prime yellow" and "good off." The "choice" refined peanut oil must not contain more that 0.1% free fatty acids; the "prime yellow" must not contain more than 0.2% free fatty acids and the color must not be deeper than 50 yellow and 5 red on the Equivalent Color Scale. The "good off" oil must conform to the same color and general requirements as "prime yellow" but may contain free fatty acids up to 0.25%.

Containers: Tins; wooden barrels.

Uses: Substitute for olive oil; edible oils; soaps.

Railroad shipping regulations: None.*

Peanut Oil. See Peanut.

Peanut Ore. See Wolframite.

Pear Essence. An alcoholic solution of amyl acetate, used as a flavoring liquid.

Pear Oil. See Amyl acetate.

Pearl Essence.

The lustrous substance obtained from the scales of certain fish and used in the manufacture of artificial pearls. Good quality pearl essence is of brilliant luster and when slightly agitated gives a unique and beautiful "whirly" effect. The color may be silvery white; some high quality specimens are faintly pinkish. Grayish or brownish colors detract from its value.

Pearl Hardening.

Commercial term for an artificial crystallized calcium sulfate.

Uses: Filler for paper; also improves appearance of cheap papers.

Pearl Moss. See Chondrus.

Pearl-sinter. See Opal.

Pearl White. See White, Cremnitz.

Pearlash. See Potassium carbonate.

Pearlite.

During the process of slowly cooling steel from higher temperatures cementite (q.v.) and ferrite (q.v.) are liberated and form, at about 700°C., a mechanical mixture made up of definite amounts of each and in the proportion of about 7 parts of ferrite to 1 part of cementite, so that the resulting conglomerate contains approximately 0.85% carbon. It exists in the form of interstratified layers or bands of ferrite and cementite and is called pearlite. While pearlite commonly occurs in slowly cooled steels in the lamellar formation, composed of alternate layers of ferrite and cementite, it may, under different rates of cooling and dependent on the relative amounts of ferrite and cementite present, exist in other formations, or phases, of which some authorities have recognized at least four, making five modifications in all. Normal pearlite has a maximum tensile strength of about 105,000 lbs., and an elongation of about 10% in two inches. It is regarded as a separate and distinct constituent of steel because it forms masses or "grains," always contains this same percentage of carbon and, in slowly cooled carbon steel, is always formed at a definite temperature.

See also: Carbon, combined and Carbon, graphitic.

Peat.

Partly decayed vegetable matter which has accumulated in marshes. Essentially the first stage in the development of coal from vegetable matter.

Typical analysis of partly dried material:

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

	Per Cent
Water	25
Ash	3
Woody fiber	50
Humus acids	22
Ammonia	2 to 3
Phosphoric acid and potash	0.10 to 0.20

Uses: Dried in blocks or briquetted and used as fuel; fertilizer material.
Railroad shipping regulations: None.*

Peat Moss. See Sphagnum.

Pectinose. See Arabinose.

Pectolite. See Zeolites.

"Peerless" Black. See under Blacks.

Peerless Explosives. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
1	B	I a
2	A	I a
4	A	I a
6	A	I a
8, L.F.	B	I a
10, L.F.	B	I a

Railroad shipping regulations: High explosive.

"Pegamoid." A proprietary brand of aluminum paint.

Pegmatite (Giant granite). A rock consisting of the same constituents as ordinary granite, namely, quartz, feldspar and mica, but irregular in texture and composed of the constituent minerals in such large size that they can be differentiated. In addition to its use as a building stone, pegmatite is often a source of lithia, zircon, tin, tungsten, tantalum, tourmaline, uranium, etc.

Pegu Catechu. See Catechu.

Pelletierine $C_8H_{15}ON$.
Color and properties: Liquid alkaloid from the root of the pomegranate.
Soluble in water, alcohol, ether, chloroform.
Uses: Medicine (in form of its salts, sulfate, tannate, valeriate, as a vermifuge).
Railroad shipping regulations: None.*

Pellitory. See Pyrethrum root.

Pencil Stone. See Pyrophyllite.

"Penetrol." The proprietary name for a compound used as a textile detergent.

"Pennalene White Oil." A proprietary name for water-white, odorless oil used for medicinal purposes.

Penninite.
Similar to clinochlore (q.v.) but differing somewhat in optical character and in habit of crystals, also in specific gravity (2.6 to 2.85).

Pennyroyal. See Hedeoma.

Pennyroyal Oil, American. See Hedeoma oil.

Pennyroyal Oil, European.
Color and properties: Yellowish to reddish-yellow essential oil, sometimes with bluish or greenish fluorescence; aromatic mint-like odor.
Chief constituents: Pulegone, limonene, dipentene, menthol, menthone.
Constants: Sp.gr. 0.930 to 0.950 (15°C.), optical rotation +15° to +25°; refractive index, 1.483 to 1.486.
Solubility in alcohol: in 4 to 7 vols. and more of 60% alcohol; in 1.5 to 2.5 vols. and more of 70% alcohol.
Derivation: By distillation of Mentha pulegium.
Adulteration: Turpentine mostly; sometimes eucalyptus oil.
Containers: 5, 10 lb. bottles; 25, 50 lb. tins.
Uses: Medicine; insectifuge.
Railroad shipping regulations: None.*

Pentachloroethane C_2HCl_5.
Color and properties: Water-white liquid.
Constants: Sp.gr. 1.709 (0°C.); b.p. 162°C.; m.p. 29°C.
Derivation: (a) By chlorination of ethyl chloride or ethylene chloride. (b) By the action of phosphorus pentachloride on chloral.
Method of purification: Distillation.
Containers: Drums; tank cars.
Uses: Solvent: organic synthesis.
Railroad shipping regulations: None.*

Pentahydroxycyclohexane. See Quercitol.

Pental. See Amylene.

Pentane (Amyl hydride; Normal and isopentane) $CH_3(CH_2)_3CH_3$.
Color and properties: A colorless, mobile, inflammable liquid; pleasant odor.
Constants: Normal: Sp.gr. 0.6454; m.p. —130.8°C.; b.p. 36.4°C.; solidifying point —200°C. Iso: Sp.gr. 0.622; b.p. 30.4°C.
Soluble in hydrocarbons, oils and ether; very slightly soluble in alcohol; insoluble in water.
Derivation: Fractional distillation from petroleum.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; iron drums.
Uses: Anesthetic; artificial ice manufacture; filling low-temperature thermometers; lubricant for Claude liquid air machine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Pentane, Normal. See Pentane.

1-Pentanol. See Amyl alcohol, primary normal.

2-Pentanol. See Methylpropylcarbinol.

3-Pentanol. See Diethylcarbinol.

Pentase. See Enzymes.

Pentasol. The name given to chemically pure amyl alcohol consisting of a mixture of the various isomers.
Composition: Approximately 50% of two primary isoamylalcohols, 25% of primary normal amyl alcohol, 25% diethylcarbinol and methylpropylcarbinol.
Derivation: Casinghead gasoline is heated by means of steam coils, and vapors are fractionated to give three fractions, of which the middle one, boiling range 28° to 37°C., is practically pure mixture of normal and isopentanes. Liquid pentane is vaporized and chlorine added and the mixture preheated to 100°C. In reaction unit chlorination takes place with formation of amylchloride and hydrogen chloride. Amyl chloride is separated from unchanged pentane by distillation and purified by redistillation. It is then hydrolyzed with sodium hydroxide and a catalyst, in vertical steel columns, splitting off sodium chloride. Alcohols are redistilled and fractionated.
Grades: Technical (free from chlorine and aldehydes).
Containers: 1, 5, 10, 50, 100 gal. drums.
Uses: Solvent in pyroxylin lacquers.
Railroad shipping regulations: None.*

Pentene. See Amylene.

Pentiformic Acid. See Caproic acid.

Pentlandite (FeNi)S.
Light bronze-yellow mineral, metallic luster.
Contains 35.57% of nickel. Soluble in nitric acid.
Constants: Sp.gr. 4.6 to 5. Hardness 3.5 to 4.
Occurrence: Canada (Ontario), Norway.
Use: Important nickel ore.

Pentoic Acid, Primary. See Valerianic acid.

Pentiformic Acid. See Caproic acid.

Pepo (Pumpkin seed; Cucurbita).
Derivation: Ripe seed of Cucurbita pepo.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Habitat: Southern Asia; Europe and North America.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (treatment of tapeworm); extraction of oil.
Railroad shipping regulations: None.*

Pepper. See Piper.

Pepper, African. See Capsicum.

Pepper, Bird. See Capsicum.

Pepper, Jamaica. See Pimenta.

Pepper Oil, Black.
Color and properties: Colorless to yellowish-green essential oil; phellandrene odor; mild taste.
Chief known constituents: Phellandrene; dipentene(?); caryophyllene.
Constants: Sp.gr. 0.87 to 0.916 at 15°C.; optical rotation —10° to +3°; refractive index, 1.489 to 1.499.
Solubility in alcohol: In 10 to 15 vols. of 90% alcohol.
Derivation: By steam distillation of the comminuted fruits of Piper nigrum, L.
Uses: Medicine.
Railroad shipping regulations: None.*

Pepper Oil, Long.
Color and properties: Viscous, greenish-yellow colored oil; ginger-like odor; mild taste.
Constants: Sp.gr. 0.861 (15°C.).
Derivation: By distillation of the fruits of Piper officinarum, DC., and Piper longum, L.
Railroad shipping regulations: None.*

Pepper, Red. See Capsicum.

Peppermint (Brandy mint; Lamb mint). Dried leaves and flowering tops of Mentha piperita.
Habitat: Asia, Europe and North America.
Grades: Technical; U.S.P.
Containers: Bales.
Uses: Medicine (aromatic stimulant); peppermint oil; menthol.
Railroad shipping regulations: None.*

Peppermint-camphor. See Menthol.

Peppermint Oil.
Color and properties: Colorless or slightly yellowish, volatile, liquid oil; darkening in color and thickening in consistency on being exposed to the air for some time; very strong, aromatic, minty odor and taste, the latter being followed by a sensation of coolness.
Chief constituent: Menthol, varying in amount from 45 to 91% according to country of origin. Other constituents: esters of menthol, cineole, menthone, pinene, limonene, etc.
Constants: Sp.gr. 0.895 to 0.921; optical rotation —6° to —43°.
Soluble in alcohol, ether and chloroform.
Derivation: By distilling the leaves and flowering tops of the peppermint plant, Mentha piperita.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: 60 lb. cases; 25, 20 lb. cans; cases 6-5 lb. bottles; cases 24-1 lb. bottles.
Uses: Medicine (similar to menthol); tooth-powders and pastes; mouth washes; manufacture of liqueurs; raw material for production of menthol; confectionery; flavoring; perfumery (soap).
Railroad shipping regulations: None.*

Pepsin (Pepsinum).
Color and properties: White or yellowish-white powder; converts proteins into albumoses and peptones.
Three types are found in commerce: (1) Insoluble in water without addition of traces of acids, (2) soluble in water, (3) not entirely soluble in water or dilute hydrochloric acid.
Derivation: Proteolytic ferment or enzyme from the glandular layer of fresh hogs' stomachs.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; 10, 25 lb. tins.
Uses: Medicine (as a digestive ferment); substitute for rennet in cheese making.
Railroad shipping regulations: None.*

Pepsinum, U.S.P. See Pepsin.

Peptone.
Color and properties: (a) From albumin: White or pale yellow, amorphous powder. (b) From meat: Light brown, amorphous powder.
Soluble in water; insoluble in alcohol.
Derivation: (a) By digestion of egg albumin by pepsin and a small quantity of dilute hydrochloric acid at 38° to 40°C. (body temperature). (b) By digestion of red meat with pancreatin at body temperature.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Preparation of nutrient media in bacteriology; nutrient.
Railroad shipping regulations: None.*

Peptone, Para-. See Syntonin.

Peraquin. See Ortizon.

Perborax. See Sodium perborate.

Perborin. See Sodium perborate.

Perchloric Acid (Fraude's reagent) $HClO_4$.
Color and properties: Clear, colorless liquid concentrated solutions explosive.
Constants: Sp.gr. 1.764.
Soluble in water.
Derivation: By distilling potassium perchlorate with strong sulfuric acid (96%), under reduced pressure in an oil bath at 140° to 190°C.
Method of purification: Rectification.
Grades: Technical, strength of solution 6 to 20%; C.P.
Containers: 1, 5 lb. glass bottles; 2, 5, 10 gal. carboys.
Uses: Medicine; analytical chemistry; manufacture of various esters; ingredient of the electrolytic bath in the deposition of lead.
Railroad shipping regulations: White label.

Perchloroethane. See Carbon trichloride.

Perchloroethylene. See Tetrochloroethylene.

Perchloromethane. See Carbon tetrachloride.

Pergamyn. See Vegetable parchment.

Perhydrit. See Ortizon.

Perhydrol. See Hydrogen peroxide.

Peri Acid. See 1-Naphthylamine-8-sulfonic acid.

Perilla Oil.
Color and properties: Light yellow liquid.
Constants: Sp.gr. 0.932 to 0.945; saponification value 191 to 193; iodine value 187 to 202; refractive index 1.4841.
Soluble in alcohol, ether, chloroform, benzine and carbon bisulfide.
Derivation: From the seeds of Perilla ocimoides, a mint grown commonly in Japan and Chosen.
Impurities: Sometimes adulterated with cottonseed oil.
Grades: Technical.
Containers: 75 lb. cases (2 tins); 375 lb. barrels.
Uses: Substitute for linseed oil in printer's ink, varnish, etc.; edible oil in Japan, China, India, etc.; manufacture of cheap varnishes; artificial leather.
Railroad shipping regulations: None.*

Periodic Acid $HIO_4.2H_2O$.
Color and properties: White crystals.
Constants: M.p. 130° to 133°C.
Soluble in water, alcohol and ether.
Derivation: By the interaction of iodine and concentrated perchloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; tins.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Oxidizing material.
Railroad shipping regulations: Yellow label(?)*

Peristaltin $C_{14}H_{18}O_8$. A glucoside recovered from Cascara sagrada. Also produced synthetically and used in medicine as a cathartic by intramuscular injection.
Railroad shipping regulations: None.*

Permanent White. See Blanc fixe.

Permanent Yellow. See Chrome yellows.

"Permutit." A trade name for an artificial zeolite used for water purification.

Pernambuco. See Lima wood.

Peronine (Morphine benzylether hydrochloride) $C_{17}H_{17}NO(OH)OC_7H_7.HCl$.
Color and properties: White prismatic crystalline powder, odorless, bitter taste, poisonous! Precipitated from its solutions by usual alkaloid reagents but differs from morphine and codeine in its solubilities and reactions towards special reagents.
Soluble in boiling water, less so in alcohol (95%), sparingly soluble in hot water.
Uses: Medicine (substitute for morphine, especially valuable in phthisis, chronic bronchitis and other pulmonary diseases, unofficial).
Railroad shipping regulations: None.*

Perosmic Acid, Anhydride or Oxide. See Osmic acid, anhydride.

Peroxide. See Hydrogen peroxide.

Persian Bark. See Cascara sagrada bark.

Persian Berries. See Frangula.

Persian Insect Flowers. See Pyrethrum flowers.

Persian Pellitory. See Pyrethrum flowers.

Persian Red. See Chrome red.

Persio. See Cudbear.

Persoz's Reagent. A reagent for the detection of silk in presence of wool. 10 grams zinc chloride is dissolved in 10 cc. water, 2 grams zinc oxide is added and the whole shaken. If this solution is warmed to 45°C., it will dissolve silk, but not wool.

Peru Apple. See Stramonium.

Peru Balsam (Peruvian balsam; Indian balsam; China oil; Chinese oil; Black balsam).
Color and properties: Dark, molasses-like liquid; pleasant aromatic odor; warm bitter taste.
Constants: Sp.gr. 1.140 to 1.150.
Soluble in alcohol and ether; miscible in acetone, glacial acetic acid and benzene.
Derivation: From Toluffera pereirae.
Habitat: San Salvador.
Method of purification: Rectification.
Grades: Technical; U.S.P.
Containers: Kegs; iron drums.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Perugene. Synthetic Peru balsam.

Peruvian Bark. See Cinchona bark, calisaya.

Pescola Oil. Proprietary name for an oil used in the tanning industry.

Petalite $LiAl(Si_2O_5)_2$ or $Li_2O.Al_2O_3.8SiO_2$.
Colorless, white, gray or occasionally pink mineral, white streak, vitreous luster. Resembles spodumene (q.v.) in appearance. Contains 4.9% lithia, sometimes with partial replacement by sodium or, less often, by potassium. Insoluble in acids.
Constants: Sp.gr. 2.39 to 2.46; hardness 6 to 6.5.
Occurrence: United States (Massachusetts, Maine), Sweden (Elba).
Used as source of lithium salts.

Petit-grain Citronier Oil. See Petit-grain oil.

Petit-grain Oil (Petit-grain citronier oil).
Color and properties: Yellowish liquid; odor similar to neroli oil.
Constants: Sp.gr. 0.887 to 0.900.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: Distilled from the leaves and unripe fruit of bitter orange tree, Citrus aurantium var. amara (southern France, Tunis) and C. assessu (Paraguay).
Method of purification: Rectification.
Grades: Technical.
Containers. 1, 5, 10 lb. bottles; 20, 25 lb. cans.
Uses: Perfumery (soaps; synthetic neroli; skin creams).
Railroad shipping regulations: None.*

"Petralol." A proprietary name for liquid petrolatum.

"Petro." A proprietary name for liquid petrolatum.

Petrol. A name used in the British Empire (except Canada) to designate gasoline (q.v.).

Petrolatum (Vaseline; Mineral fat; Petroleum jelly; Cosmoline; Petroleum ointment; Saxoline; White vaseline).
Light yellow to amber-colored, gelatinous, oily, translucent, semi-solid, amorphous mass whose consistency varies with the temperature.
Chief constituents: Hydrocarbons of the methane series, ($C_{16}H_{34}$ up to $C_{32}H_{66}$), and of the olefine series, ($C_{16}H_{32}$, etc.).
Constants: Sp.gr. 0.820 to 0.850; m.p. 45° to 48°C.
Soluble in chloroform, ether, benzine, carbon bisulfide, benzene and oils; very slightly soluble in alcohol; insoluble in water.
Derivation: By fractional distillation of still residues from the steam distillation of paraffin-base petroleum, or from steam-reduced amber crude oils (oils from which the light fractions have been removed).
Grades: Natural petrolatum produced as above; artificial petrolatums made by mixing heavy petroleum lubricating oil with a low melting point paraffin wax; U.S.P.
White petrolatum (White vaseline; Albolene) is made from the ordinary petrolatum by bleaching or additional treatment with decolorizing carbon.
Containers: Glass bottles; tins; 300-350 lb. barrels.
Uses: Medicine and pharmacy (as a protective dressing and as a substitute for fats in ointments); modeling clay; shoe polishes; lubricating greases; metal polishes; leather grease; lubricant; rust preventative; perfume extractor.
Railroad shipping regulations: None.*

Petrolatum Album, U.S.P. White petrolatum.

Petrolatum, Liquid (Liquid paraffin; Alboline; White mineral oil; Glycolin; Paraffin oil).
Color and properties: A colorless, transparent, oily liquid.
Constants: Sp.gr. 0.840 to 0.940.
Soluble in ether, chloroform, carbon bisulfide, benzine, benzene, boiling alcohol and fixed or volatile oils; insoluble in water and cold alcohol.
Derivation: Distillation of that portion of petroleum boiling between 330° and 390°C., obtained after removal of the lighter constituents.
Method of purification: Treatment with sulfuric acid, then with caustic soda, followed by filtration, while hot, through decolorizing carbon; on cooling, some solid paraffins separate out, the liquid portion is redistilled and only that portion boiling above 360°C. retained.
Grades: Technical.
Containers: Wooden barrels; tins; glass bottles.
Uses: Medicine (as a demulcent for the mucous membrane of the upper respiratory tract, as a dressing for wounds, and for its laxative effect).
Railroad shipping regulations: None.*

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Petrolenes (Malthenes).

Constituents of bitumens, soluble in hexane.

Petroleum (Earth oil; Lima oil; Naphtha; Crude oil).

Color and properties: A thick, heavy, inflammable liquid, varying in color from yellow to dark reddish-brown or black according to its place of origin. It has a peculiar distinct heavy odor also varying with its place of origin and composition. It usually shows a distinct greenish fluorescence.

Constants: Sp.gr. 0.780 to 0.970.

Derivation: All petroleums are mixtures of hydrocarbons, as many as one hundred and fifty different hydrocarbons having been found in the different crude oils. The important constituents are benzine, gasoline, kerosene (solar oil), paraffin, petrolatum (vaseline), petroleum ether, ligroin, petrolene, heavy lubricating oils, etc. Crude petroleum is separated into its constituents by fractional distillation with subsequent chemical purification of the individual fractions, followed by redistillation.

Containers: Tank cars; barrels.

Railroad shipping regulations: None(?)* (Depends upon flash point.)

Petroleum Asphalt. See Asphalt.

Petroleum Coke. See Coke.

Petroleum Ether (Benzine; Benzinum purificatum, U.S.P.; Canadol; Petroleum naphtha; Light ligroin).

Color and properties: A mixture of several of the lighter constituents of petroleum (cymogene, rhigoline and gasoline).

Constants: Sp.gr. 0.635 to 0.660; b.p. 40° to 70°C.

Soluble in alcohol, ether, chloroform, benzene, and fixed and volatile oils (except castor oil).

Derivation: By fractional distillation of petroleum.

Method of purification: Washing with sulfuric acid, then with soda and redistilling.

Grades: Technical; pure; C.P.; U.S.P.

Containers: Tin cans; iron drums.

Uses: Solvent.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label.

Petroleum Jelly. See Petrolatum.

Petroleum Naphtha. See Petroleum ether.

Petroleum Ointment. See Petrolatum.

Petroleum, Saponified.

Liquid: Liquid petroleum, oleic acid, and spirits of ammonia compounded in the ratio of 100, 50 and 25 parts respectively.

Solid: Petrolatum, oleic acid, and spirits of ammonia compounded in the ratio of 100, 50 and 25 parts respectively.

Railroad shipping regulations: None.*

Petroleum Tailings. See Residuum.

Petroselinum (Parsley).

Derivation: Herb, root and seed of Petroselinum sativum.

Habitat: Europe; cultivated everywhere.

Grades: Technical.

Containers: Bags.

Uses: Medicine; cooking.

Railroad shipping regulations: None.*

Petzite $(Au.Ag)_2Te$ or Ag_3AuTe_2.

One of the gold telluride group of minerals. Steel-gray to iron-black color, metallic luster. Resembles coloradoite (q.v.) in appearance, with which it is often found. Contains 20 to 25% gold.

Constants: Sp.gr. 8.72 to 9.02; hardness 2.5 to 3.

Occurrence: United States (California, Colorado), Australia, Canada.

Pewter.

An alloy consisting of about 88% tin, 7% antimony, 3% copper, and 1% zinc.

Phalaris. Canary seed.

Pharbitis Seeds. See Kaladana.

Pharbitisin. See Kaladana resin.

Phaseolus. Haricot, common bean or French string-bean.

Phenacaine Hydrochloride. See Diethoxyethenyl-diphenlyamidine hydrochloride, para-.

Phenacetin. See Acetophenetidine.

Phenacetin-urethane. See Thermodin.

Phenacite $BeSiO_4$.

A natural glucinum silicate. Colorless or yellow, red or brown in color. White streak, vitreous luster.

Constants: Sp.gr. 2.97 to 3; hardness 7.5 to 8.

Occurrence: United States (Colorado, Montana, New Hampshire), Russia, France, Norway, Mexico, Brazil.

Uses: Gem stones.

Phenanthraquinone. See Phenanthrenequinone.

Phenanthrene (Ortho-diphenyleneethylene; Phenanthrin) $(C_6H_4CH)_2$.

Color and properties: Small, colorless, shining crystals.

Constants: Sp.gr. 1.063; m.p. 100.35°C.; b.p. 340°C.

Soluble in alcohol, ether, benzene, carbon bisulfide and acetic acid; insoluble in water.

Derivation: Fractional distillation of high-boiling coal-tar oils, with subsequent recrystallization from alcohol.

Method of purification: Fractional oxidation (chromic or nitric acid) to remove anthracene.

Impurities: Anthracene.

Grades: Technical.

Containers: Tins.

Uses: Dyestuffs; explosives; synthesis of drugs; phenanthrenequinone.

Railroad shipping regulations: None.*

Phenanthrenequinone (Erroneously: Phenanthraquinone) $C_6H_4CO_2.CO_2C_6H_4$.

Color and properties: Yellow-orange, needle-like crystals.

Constants: Sp.gr. 1.4045; m.p. 202°C.; b.p.: Sublimes above 360°C.

Soluble in sulfuric acid, benzene, glacial acetic acid and hot alcohol; slightly soluble in ether; insoluble in water.

Derivation: By oxidation of a boiling solution of phenanthrene in glacial acetic acid with chromic acid, solution in sodium bisulfite, precipitation by means of hydrochloric acid and recrystallization.

Grades: Technical.

Containers: Wooden kegs.

Uses: Organic synthesis; dyes.

Railroad shipping regulations: None.*

Phenanthrin. See Phenanthrene.

Phenazone. See Antipyrine.

Phenegol (Mercury potassium-para-nitrophenolsulfonate) $C_6H_5(ONO_2SO_3K)Hg(KSO_3NO_2O)C_6H_5$.

Color and properties: Reddish-brown powder, tasteless. Contains 33% mercury. Germicidal in 0.4% solution. Non-irritant.

Soluble in water.

Uses: Medicine (antisyphilitic, unofficial).

Railroad shipping regulations: None.*

Phenetidine Amygdolate. See Amygdophenine.

Phenetidine Citrate. See Apolysin.

Phenetidine Citrate, Para-. See Citrophen.

Phenetidine Quinine Carbonate. See Quinaphenine.

Phenetolecarbamide. See Dulcin.

Phenic Acid. See Phenol.

Phenobarbital. See Luminal.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Phenocoll Hydrochloride (Aminoacetyl-para-phenetidine hydrochloride) $C_2H_5OC_6H_4NHCOCH_2NH_2 . HCl$.

Color and properties: Fine, white crystalline powder.

Constants: M.p. 95°C.

Soluble in water and warm alcohol.

Derivation: By the action of glycocoll upon phenetidine.

Uses: Medicine (antipyretic, unofficial).

Railroad shipping regulations: None.*

Phenol (Carbolic acid; Phenic acid; Phenylic acid; Phenyl hydrate; Hydroxybenzene) C_6H_5OH.

Color and properties: White, crystalline mass which turns pink or red if not perfectly pure or under influence of light; absorbs water from the air and liquefies; sharp burning taste; distinctive odor; strong, corrosive poison! When in weak solution it has a sweetish taste.

Constants: Sp.gr. 1.0677; m.p. 42.5° to 43°C.; b.p. 182.6°C.

Soluble in alcohol, water, ether, chloroform, glycerol, carbon bisulfide, petrolatum, fixed or volatile oils and alkalis.

Derivation: (a) Treating the coal-tar oil fraction boiling between 170° and 230°C., with caustic soda to form phenolate; the solution is purified by steam to remove naphthalene, treated with acid to set phenol free and purified by distillation.

(b) Benzene is converted into the sulfonic acid and the latter fused with caustic soda. On treating the sulfonate with acid, pure phenol is liberated and may be distilled off.

Method of purification: Dissolved in water, crystallized out, centrifuged and redistilled.

Impurities: Cresols; water.

Grades: Fused; crystals; C.P.; U.S.P.; synthetic; crude; liquid, U.S.P. (cresol and phenol).

Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 55 gal. drums (475 lbs.); 200 lb. galvanized drums; tank cars.

Uses: Disinfectant for sanitary, medical and surgical purposes; manufacture of picric acid, salicylic acid, phenacetin and various intermediates for the production of dyes; paint and varnish removers; synthetic resins and plastics; phenates; brewing (cleansing agent); explosives; synthesis of artificial tannins; disinfecting and germicidal paints; synthetic perfumes; pharmaceutical (germicide, antiseptic, deorodizing preparations, germicidal soaps).

Railroad shipping regulations: Class B poison.

"Phenolax." See Phenolphthalein.

Phenolbismuth. See Bismuth phenate.

Phenolbromate. See Bromophenol.

Phenol Coefficient of a Disinfectant.

The phenol coefficient of a disinfectant is the parts by weight of pure carbolic acid equivalent to one part of the particular disinfectant. In determining the phenol coefficient of a disinfectant in a laboratory, concentrations are chosen which will kill a standard culture of B. coli in two and one-half minutes.

Phenoldisulfonic Acid $C_6H_3OH(SO_3H)_2$.

Color and properties: Deliquescent, colorless needles.

Soluble in water and alcohol.

Derivation: By the interaction of phenol and sulfuric acid with sulfurous acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Iron drums.

Uses: Intermediates; synthesis of drugs.

Railroad shipping regulations: None.*

Phenolphthalein (Dioxytriphenylcarbinolcarboxylic acid anhydride; Dioxytriphenylphthalide; Dihydroxyphthalophenone; Para-phthalein) $(C_6H_4OH)_2COC_6H_4CO$.

Color and properties: A pale yellow, crystalline powder; forms an almost colorless solution in neutral or acid solution and a bright purple-carmine solution in presence of alkali, but colorless in the presence of large amounts of alkali.

Constants: Sp.gr. 1.2765; m.p. 250° to 256°C.

Soluble in alcohol, ether and alkalis; insoluble in water.

Derivation: Fused phenol is added to phthalic acid anhydride dissolved in concentrated sulfuric acid (cooled) and the whole heated 10 to 12 hours, then poured hot into boiling water and boiled with repeated changes of water. The residue is dissolved in warm dilute caustic soda and precipitated with acetic acid.

Method of purification: Recrystallization from absolute alcohol after filtering through animal charcoal.

Impurities: Phenol; phthalic acid.

Grades: Technical; pure reagent; U.S.P.

Containers: 1 lb. bottles; 1 lb. tins; 5, 25 lb. cans; 50, 100, 250 lb. drums.

Uses: Dyes; indicator in volumetric analysis; medicine.

Railroad shipping regulations: None.*

Phenolphthalein is sold under the following brand names: "Phenolax," Purgen, Purgolade, Purglets, Laxan, Laxol.

Phenol Red. See Phenolsulfonphthalein.

Phenol Salicylate. See Salol.

Phenol Soda.

Compound solution of sodium carbolate (q.v.).

Phenolsulfonic Acid (Sulfocarbolic acid) $C_6H_5SO_3H$.

Color and properties: Yellowish liquid, becoming brown on exposure to air. A mixture of ortho- and para-phenolsulfonic acids.

Soluble in water and in alcohol.

Derivation: By the action of sulfuric acid on phenol.

Grades: Technical.

Containers: Iron drums.

Uses: Water analysis; starting point in manufacture of intermediates and dyes; tanning materials (by heating in a vacuum and by condensation with formaldehyde); pharmaceutical (disinfectant, drugs, starting point in manufacture of various products).

Railroad shipping regulations: White label (?)*

Phenolsulfonphthalein (Phenol red) $(C_6H_4OH)_2COC_6H_4SO_2$.

Color and properties: Bright to dark red crystalline powder.

Slightly soluble in water, alcohol, acetone.

Derivation: Reaction of phenol with sulfobenzoic acid anhydride. Differs from phenolphthalein in containing an SO_2 group in place of CO.

Uses: Indicator in chemical analysis; diagnostic reagent in medicine.

Railroad shipping regulations: None.*

Phenosal. See Salicyl-para-phenetidine.

Phenoval (Bromoisovaleryl-para-phenetidine, alpha-) $(CH_3)_2CHCHBrCONHC_6H_4OC_2H_5$

Color and properties: Tasteless, odorless crystals.

Constants: M.p. 150°C.

Uses: Medicine (antipyretic, hypnotic antineuralgic, unofficial).

Railroad shipping regulations: None.*

Phenoxy-dihydroxy-propane. See Antodyne.

Phenol Trinitrate. See Picric acid.

Phenyform $[C_6H_4(OH)CH_2OH]xCH_2O$.

Color and properties: Grayish powder, odorless. Non-toxic.

Soluble in alcohol and alkaline solutions; insoluble in water.

Derivation: A condensation product of phenol and formaldehyde.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Medicine (dusting powder in suppurating processes, urethritis, unofficial).
Railroad shipping regulations: None.*

Phenylacetaldehyde (Ethylalbenzene; Hyacinthin) $C_6H_5CH_2CHO$.
Color and properties: Colorless liquid; very strong hyacinth-like odor.
Constants: Sp.gr. 1.0315; m.p.: Below —10°C.; b.p. 193° to 194°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: From phenyl-alpha-chloroacetic acid, by action of alkalis, or by heating phenyl lactic acid with dilute sulfuric acid.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 5 lb. bottles.
Uses: Perfumes.
Railroad shipping regulations: None.*

Phenylacetamide. See Acetanilide.

Phenyl Acetate $C_6H_5C_2H_3O_2$.
Color and properties: Water-white liquid.
Constants: Sp.gr. 1.0809 (15°/15°).
Infinitely soluble in alcohol and ether; very slightly soluble in water.
Derivation: (a) From phenol and acetyl chloride. (b) By heating triphenyl phosphate with potassium acetate and alcohol. (c) By heating lead acetate and phenol with carbon bisulfide.
Method of purification: Fractional distillation.
Containers: Glass bottles; carboys.
Uses: Solvent; organic synthesis.
Railroad shipping regulations: None.*

Phenylacetic Acid (Alpha-toluic acid) $C_6H_5CH_2CO_2H$.
Color and properties: Shiny, white plate crystals.
Constants: Sp.gr. 1.0809; m.p. 76°C.; b.p. 262°C.
Soluble in alcohol, ether, and water.
Derivation: By the interaction of benzyl cyanide and alkali and hydrolyzing the nitrile thus formed.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1, 5 lb. bottles; 5, 25 lb. tins.
Uses: Perfume; medicine.
Railroad shipping regulations: None.*

Phenylacetic Acid Nitrile. See Benzyl cyanide.

Phenylacetic Aldehyde (Phenylacetaldehyde) $C_6H_5CH_2CHO$.
Color and properties: Colorless, viscous, liquid of strong hyacinth odor.
Constants: Sp.gr. 1.032; b.p. 193° to 194°C.
Soluble in alcohol and ether, only slightly in water.
Derivation: Reduction of phenyl acetic acid or from cinnamic acid.
Grades: Technical; pure; 50% pure.
Containers: 1, 5 lb. bottles.
Uses: Perfumery (hyacinth oils, narcissus, sweet-pea).
Railroad shipping regulations: None.*

Phenylacetylsalicylate (Acetyl salol; Spiroform; Vesipyrin) $CH_3COOC_6H_4COOC_6H_5$.
Color and properties: Tasteless, odorless powder. Decomposed by alkalis.
Insoluble in water.
Uses: Medicine (urinary antiseptic, antirheumatic, analgesic, unofficial).
Railroad shipping regulations: None.*

Phenylacrylic Acid, Beta-. See Cinnamic acid.

Phenylallylic Alcohol. See Cinnamic alcohol.

Phenyl-alpha-naphthylamine $C_{10}H_7NHC_6H_5$.
Color and properties: Crystallizes in prisms; white to slightly yellowish.
Constants: M.p. 62° C.; b.p. 325° C.
Soluble in alcohol, ether and benzene.
Derivation: From alpha-naphthylamine and aniline.
Method of purification: Distillation.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes and other organic chemicals.
Railroad shipping regulations: None.*

Phenylamine. See Aniline.

Phenyl-2-amino-5-naphthol-7-sulfonic Acid (Phenyl J acid).
Color and properties: Slate-colored.
Soluble in alkali.
Derivation: Is prepared from H acid and aniline (condensation with heat).
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Phenyl-2-amino-8-naphthol-6-sulfonic Acid (Phenyl gamma acid).
Color and properties: Gray.
Soluble in alkali.
Derivation. Is prepared from gamma acid and aniline (condensation with heat).
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Phenylaniline. See Diphenylamine.

Phenylazoaniline. See Aminoazobenzene.

Phenylbarbital. See Luminal.

Phenylbenzamide. See Benzanilide.

Phenylbenzoylcarbinol. See Benzoin.

Phenylboric Acid. See Borophenylic acid.

Phenylcarbylamine Chloride $C_6H_5NCCl_2$. A military poison gas used in the late war.

Phenyl Chloride. See Chlorobenzene.

Phenyl Chloroform. See Benzotrichloride.

Phenylcinchonic Acid. See 2-Phenylquinoline-4-carboxylic acid.

Phenylcinchoninic Acid Ethyl Ester. See Acitrin.

Phenyl Cyanide. See Benzonitrile.

Phenyldimethylisopyrazolone. See Antipyrine.

Phenyldimethylpyrazole. See Antipyrine.

Phenylene. See Antipyrine.

Phenylenediamine (Diaminobenzene) $C_6H_4(NH_2)_2$. (a) Ortho-; (b) Meta-; (c) Para-.
Color and properties: (a) Colorless crystals. (b) Colorless needles; unstable in air; usually in the form of the stable hydrochloride. (c) Colorless crystals, blackening somewhat in air; poisonous!

Constants:	(a)	(b)	(c)
Specific gravity	....	1.1389	.....
Melting-point	102°-103°C.	63°C.	140°C.
Boiling-point	256°-258°C.	282°-284°C.	267°C.

Soluble in alcohol, ether and water.
Derivation: Reduction of ortho-, meta- or para-dinitrobenzenes or nitroanilines with iron and hydrochloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Barrels; tins.
Uses: (a) No practical use.
(b) Dyestuff manufacture; reagent for detecting nitrous acid; textile developing agent.
(c) Dyeing hair and furs; rubber industry; dye manufacture; chemical analysis; dyeing and printing black and brown shades by the oxidation process.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Phenylethyl Acetate.
Color and properties: Colorless liquid; peach odor.
Constants. Sp.gr. 1.031; b.p. 226°C.
Soluble in alcohol, ether.
Grades: Technical.
Containers: Glass bottles.
Uses: Perfumery.
Railroad shipping regulations: None.*

Phenylethyl Alcohol (Benzyl carbinol) $C_6H_5CH_2CH_2OH$.
Color and properties: Colorless liquid, honey rose odor.
Constants: Sp.gr. 1.0235; m.p. —27°C.; b.p. 219°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: (a) By reduction of phenylaceticethyl ester by sodium in absolute alcohol. (b) By the action of ethylene oxide on phenylmagnesium bromide, and subsequent hydrolysis.
Method of purification: Rectification.
Grades: Technical.
Containers: Tin cans and glass bottles.
Uses: Organic synthesis; perfumery; synthetic rose oil.
Railroad shipping regulations: None.*

Phenylethylbarbituric Acid. See Luminal.

Phenylethylene. See Styrene.

Phenylethylhydantoxin. See Nirvanol.

Phenylethylmalonylurea. See Luminal.

Phenylformamide. See Formanilide.

Phenylformic Acid. See Benzoic acid.

Phenyl Gamma Acid. See Phenyl-2-amino-8-naphthol-6-sulfonic acid.

Phenylglucosazone $C_{18}H_{22}N_4O_4$.
Color and properties: Thin, yellow, needle-like crystals.
Constants: M.p. 217°C.
Soluble in alcohol; very slightly soluble in water.
Derivation: By condensation of phenylhydrazine hydrochloride and glucose with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Phenylglycine, Sodium Salt $C_6H_5CH_2COONa$.
Color and properties: White crystalline solid.
Derivation: (1) From monochloracetic acid and aniline using caustic soda as a condensing agent. (2) From ferrous sulfate and monochloracetic acid to which aniline is added. The ferrous phenylglycine formed is then decomposed with soda ash. (3) By the interaction of aniline, formaldehyde and sodium cyanide in alcoholic solution.
Grades: Technical.
Containers: Iron barrels.
Uses: Manufacturers of synthetic indigo.
Railroad shipping regulations: None.*

Phenylglycolate. See Tussol.

Phenylglycolic Acid. See Amygdalic acid.

Phenyl Hydrate. See Phenol.

Phenylhydrazine $C_6H_5NHNH_2$.
Color and properties: Pale yellow crystals or oily liquid; becomes red-brown on exposure to air; poisonous!
Constants: Sp.gr. 1.0978; m.p. 19.35°C.; b.p. 243.5°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: Aniline is diazotized and then reduced, producing diazobenzene hydrochloride, which is decomposed by caustic soda and dissolved in ether. The ethereal solution is dried and the ether evaporated.
Method of purification: Vacuum distillation.
Grades: Commercial; C. P.; reagent.
Containers: Glass bottles; tins.
Uses: Analytical chemistry (reagent for detecting aldehydes, sugars, etc.); organic synthesis (intermediates, dyestuffs, pharmaceuticals).
Railroad shipping regulations: None.*

Phenylhydrazine Hydrochloride $C_6H_5NHNH_2.HCl$.
Color and properties: Colorless, crystalline scales; sublimable, if cautiously heated.
Soluble in water, alcohol and ether.
Derivation: Treatment of phenylhydrazine with hydrochloric acid.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Analytical chemistry for differentiation of sugars; organic synthesis.
Railroad shipping regulations: None.*

Phenyl Hydride. See Benzene.

Phenylhydroxyacetic Acid. See Amygdalic acid.

Phenylic Acid. See Phenol.

Phenylisothiocyanate. See Phenylmustard oil.

Phenyl J Acid. See Phenyl-2-amino-5-naphthol-7-sulfonic acid.

Phenylmethane. See Toluene.

1-Phenyl-3-methyl-5-pyrazolone $C_{10}H_{10}ON_2$.
Color and properties: White powder or crystals.
Constants: M.p. 127°C.; b.p. 287°C. (205 mm.).
Soluble in water; slightly soluble in alcohol, ether or benzene.
Derivation: By condensation of phenylhydrazine with ethylacetoacetate.
Method of purification: Crystallization.
Grades: Technical; C.P.
Uses: Intermediate for drugs and dyes.
Railroad shipping regulations: None.*

1-Phenyl-3-methyl-5-pyrazolone Sulfonic Acid $C_{10}H_{10}N_2SO_4$.
Color and properties: White.
Constants: Crystallizes with 1 molecule of water of crystallization.
Soluble in cold water (sparingly).
Derivation: Phenylhydrazine sulfonic acid is condensed with acetoacetic ester.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Phenylmustard Oil (Thiocarbanil; Phenylisothiocyanate; Phenylthiocarbonimide) C_6H_5NCS.
Color and properties: A pale yellow liquid; penetrating, irritating odor; readily volatilized with steam.
Constants: Sp.gr. 1.1382; m.p. —21°C.; b.p. 221°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By action of concentrated hydrochloric acid on sulfocarbanilide; (b) By reaction of thiophosgene with aniline.
Method of purification: Rectification.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine; organic synthesis.
Railroad shipping regulations: None.*

Phenylnaphthylamine (a) Phenyl-alpha-naphthylamine; (b) Phenyl-beta-naphthylamine. $C_{10}H_7NHC_6H_5$.
Color and properties: (a) Crystalline prisms or scales; (b) Crystal needles.
Constants: M.p: (a) 62°C.; (b) 107.5° to 108°C.; b.p.: (a) 226°C.; (b) 395° to 399.5°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By heating the hydrochloride of

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

alpha- naphthylamines with aniline. (b) By heating beta-naphthol and aniline or aniline hydrochloride in an open vessel to 200°C.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels; kegs.
Uses: Organic synthesis; dye intermediate.
Railroad shipping regulations: None.*

Phenyl-1-Naphthylamine-8-Sulfonic Acid $C_{16}H_{13}NO_3S$.
Color and properties: Greenish-gray needles. Rather insoluble in water; soluble in alcohol.
Derivation: Arylation of 1-naphthylamine-8-sulfonic acid with aniline.
Grades: Technical; mostly as sodium salt.
Containers: Barrels or steel drums.
Uses: Azo colors.
Railroad shipping regulations: None.*

Phenylone. See Antipyrine.

Phenyl Oxide. See Geranium crystals.

Phenylphenol, Ortho- (Ortho-hydroxydiphenyl) $C_6H_5C_6H_4OH$.
Color and properties: Nearly white crystals.
Constants: M.p. 56° to 58°C.
Soluble in alcohol.
Derivation: From reaction of chlorobenzene and caustic soda solution at elevated temperatures and pressure.
Method of purification: Distillation.
Grades: Technical; C.P.
Containers: Barrels; drums.
Uses: Intermediate for dyes.
Railroad shipping regulations: None.*

Phenylphenol, Para- (Para-hydroxydiphenyl) $C_6H_5C_6H_4OH$.
Color and properties: Nearly white crystals.
Constants: M.p. 16° to 17°C.
Soluble in alcohol.
Derivation: From reaction of chlorobenzene and caustic soda solution at elevated temperatures and pressure.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Barrels and drums.
Uses: Intermediate for dyes.
Railroad shipping regulations: None.*

Phenylpropiolic Acid C_6H_5COOH.
Color and properties: Colorless needles. Keep dark. (Used in the form of sodium phenylpropiolate).
Constants: M.p. 136° to 137°C.; b.p.: sublimes.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating ethylcinnamic dibromide with alcoholic potash.
Method of purification: Crystallization.
Grades: Technical.
Containers: Iron drums; amber glass bottles.
Uses: Organic synthesis (intermediates, pharmaceuticals).
Railroad shipping regulations: None.*

2-Phenylquinoline-4-carboxylic Acid (Atophan; Cinchophen; Phenylcinchonic acid). $C_9H_5N(C_6H_5)(COOH)$.
Color and properties: Colorless needles or white to yellowish-white powder; slightly bitter taste. Faint odor resembling benzoic acid.
Constants: M.p. 212° to 213°C.
Soluble in ethyl and methyl alcohols, acetone, benzene, chloroform, ether.
Derivation: (a) By heating in alcoholic solution of aniline, pyruvic acid and benzaldehyde. (b) By heating benzylidene and pyruvic acid and adding a solution of aniline in absolute alcohol. (c) By heating isatin, acetophenone and caustic potash solution.
Grades: U.S.P.
Containers: 1 lb. cartons.
Uses: Used in medicine (gout, rheumatic fever, and as kidney stimulant).
Railroad shipping regulations: None.*

Phenyl Salicylate. See Salol.

Phenylthiocarbonimide. See Phenylmustard oil.

Phenyl-urethane. See Euphorin.

Philipstadite. See Hornblend.

Phlogopite. See Mica.

Phloridzin (Phlorizin; Phlorrhizin) $C_{21}H_{24}O_{10}\cdot 2H_2O$.
Color and properties: Light, white, small, silky needles; sweet taste and a bitter after-taste; poisonous!
Constants: Sp.gr. 1.4298; m.p. 109°C.; solidifies and then does not melt until a temperature of 170°C. is reached.
Soluble in alcohol and hot water; very slightly soluble in ether.
Derivation: By extraction of the glucoside from the root-bark of apple, pear, plum and cherry trees.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine; biochemical experimentation.
Railroad shipping regulations: None.*

Phlorizin. See Phloridzin.

Phloroglucine. See Phloroglucinol.

Phloroglucinol (Trioxybenzene; Phloroglucine) $C_6H_3(OH)_3\cdot 2H_2O$.
Color and properties: White to yellowish crystals.
Constants: M.p. 217° to 219°C., if rapidly heated; 200° to 209°C., if slowly heated.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: By fusion of resorcinol with caustic soda.
Method of purification: Crystallization.
Impurities: Resorcinol; diresorcinol.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Analytical chemistry (reagent for pentoses and with vanillin for determining the presence of free hydrochloric acid); medicine; decalcifying agent for bones.
Railroad shipping regulations: None.*

Phlorrhizin. See Phloridzin.

Phosgene. See Carbonyl chloride.

Phosgene, Di-. See Trichloromethylchloroformate.

Phosgenite (Cromfordite) $PbCl_2\cdot PbCO_3$.
Colorless or gray mineral of adamantine luster. Found in cavities of corroded galenite.
Constants: Sp.gr. 6.1 to 6.2; hardness 3.
Occurrence: Sardinia, Tasmania, Silesia.

Phosphate Rock. A natural rock consisting largely of calcium phosphate used chiefly as a raw material for manufacture of phosphatic fertilizers, superphosphate, triple (or treble) superphosphate and dicalcium phosphate. A small amount is ground and applied directly to the soil. Among the minor uses are the manufacture of phosphorus and phosphoric acid and of ferrophosphorus for use in the steel industries. For adjusting the phosphorus content of pig iron, phosphate rock is included in the blast-furnace charge.

Phosphazote. A proprietary brand of fertilizer developed abroad. It is said to consist essentially of a mixture of urea and acid phosphate and usually contains about 11% nitrogen and 11% phosphoric acid. The proportions of nitrogen and phosphoric acid can, however, be varied within rather wide limits.
Railroad shipping regulations: None.*

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Phosphine (Hydrogen phosphide; Phosphuretted hydrogen; Phosphoretted hydrogen) PH_3.

Color and properties: Colorless; spontaneously inflammable gas; disagreeable, garlic-like odor; exceedingly poisonous!

Constants: Sp.gr. 1.185; m.p. -133.5°C.; b.p. -85°C.

Soluble in alcohol, ether and cuprous chloride; slightly soluble in cold water; insoluble in hot water.

Derivation: By action of nascent hydrogen or of caustic potash on phosphorus.

Grades: Technical.

Containers: Steel cylinders.

Uses: Organic preparations.

Fire hazard: Dangerous.*

Railroad shipping regulations: Poison gas (?)* Not usually shipped.

Note: There is also a synthetic dye, chrysaniline yellow, which is sometimes called phosphine.

Phosphomolybic Acid (Sonnenschein's reagent) $H_3PO_4.12MoO_3$.

Color and properties: Yellowish crystals.

Soluble in water, alcohol and ether.

Derivation: By heating ammonium phosphomolybdate with aqua regia.

Method of purification: Crystallization.

Impurities: Heavy metals.

Grades: Technical; C.P.

Containers: 1 lb. bottles.

Uses: Reagent for alkaloids.

Railroad shipping regulations: None.*

Phosphorated Oil (Phosphorized oil).

Almond oil containing dissolved phosphorus, used for the internal administration of phosphorus.

Phosphor Bronzes. Non-ferrous alloys of following compositions: (a) Phosphor bronze 30 contains 95.5% copper, 4.3% tin and 0.2% phosphorus. (b) Phosphor bronze 47 contains 91.6% copper, 8.25% tin and 0.15% phosphorus. (c) Phosphor bronze 209 contains 90% copper, 10% tin and a trace of phosphorus. They are all resistant to cold sulfuric and acetic acids at all concentrations and to the hot dilute acids under certain conditions of operation. They are also resistant to hot and cold sodium hydroxide in all concentrations and to sea water, moist sulfurous atmospheres and mine waters.

Phosphoretted Hydrogen. See Phosphine.

Phosphoric Acid (Ortho-phosphoric acid) H_3PO_4.

Color and properties: Clear, colorless, sirupy liquid.

Constants: Sp.gr. 1.884; m.p. 38.6°C.

Soluble in water.

Derivation: Action of sulfuric acid on pulverized phosphate rock. Pure-boiling red phosphorus with nitric acid.

Grades: C.P.; U.S.P.; 75% H_3PO_4 (sp.gr. 1.610); 50% H_3PO_4 (sp.gr. 1.360 to 1.40); paste (45 to 50% P_2O_5).

Containers: 1, 5 lb. bottles; wooden barrels; glass carboys; tank cars.

Uses: Chemical (preparation of various phosphates; preparation of hydrogen peroxide; manufacture of ethylene gas; making albumen derivatives); analytical reagent; ceramics; sugar industry; drying agent in synthesis of various dyes and intermediates; manufacture of incandescent light filaments; fertilizer manufacture; substitute for tartaric and citric acids in manufacture of jellies, essences, and soft drinks; glass; pickling and rust-proofing iron; dental cements; pharmaceuticals; process engraving and lithography; coagulation of rubber latex; textiles (dyeing cotton and calico, printing, brightening the color of silks); water softening.

Railroad shipping regulations: None.*

Phosphoric Acid, Anhydrous (Phosphorus pentoxide; Phosphoric anhydride) P_2O_5.

Color and properties: Soft, white powder.

Constants: Sp.gr. 2.387; m.p. 800°C.

Soluble in water.

Derivation: By burning phosphorus in iron cylinders in a current of dry air.

Grades: Technical.

Containers: Iron canisters, hermetically sealed; sealed glass vials.

Uses: Preparation of phosphoric acids; dehydrating agent; organic synthesis; medicine; sugar refining.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Phosphoric Acid, Glacial (Meta-phosphoric acid) HPO_3.

Color and properties: Transparent, highly deliquescent, glassy mass.

Constants: Sp.gr. 2.2 to 2.488.

Soluble in water, slowly forming the ortho-acid; soluble in alcohol.

Derivation: By heating phosphoric acid to redness; by treating phosphorus pentoxide with the calculated quantity of water; by heating diammonium phosphate.

Grades: Technical; C.P.

Containers: 2 lb. glass bottles.

Uses: Phosphates; analytical chemistry.

Railroad shipping regulations: None.*

Phosphoric Acid, Meta-. See Phosphoric acid, glacial.

Phosphoric Acid, Ortho-. See Phosphoric acid.

Phosphoric Acid, Reverted.†

This term has a different meaning in the United States than it has in Europe.

The phosphoric acid in acid phosphate may be divided into three parts: (1) water-soluble, (2) insoluble in water but soluble in neutral ammonium citrate, and (3) insoluble in both water and neutral ammonium citrate.

When acid phosphate is first made nearly all of the phosphoric acid except that insoluble in neutral ammonium citrate solution is water-soluble. As the acid phosphate cures, the water-soluble usually decreases, the citrate-soluble portion increases, and the citrate insoluble decreases.

In Europe the water-soluble phosphoric acid alone is given value and is called "available." In the United States both the water-soluble and the ammonium citrate-soluble are counted available. Therefore, in Europe, reverted phosphoric acid means that which has been changed from the water-soluble to either the citrate-soluble or citrate-insoluble form. In the United States, the term may mean the same, but more often it refers to an increase of the citrate-insoluble phosphoric acid, with a corresponding reduction of the available portion.

The addition of lime, limestone, cyanamide or similar materials causes some reversion of phosphoric acid to the citrate-insoluble form, but more to the citrate-soluble, with a corresponding reduction of the water-soluble.

† "American Fertilizer Hand Book," Philadelphia, Ware Bros. Co., 1927.

Phosphoric Anhydride. See Phosphoric acid, anhydrous.

Phosphorite. Phosphate rock (q.v.).

Phosphorized Oil. See Phosphorated oil.

Phosphoric Chloride. See Phosphorus pentachloride.

Phosphoric Perchloride. See Phosphorus pentachloride.

Phosphorus P. (a) Yellow; (b) Red.

Color and properties: A solid non-metallic element. (a) Light yellow, wax-like, semi-transparent, crystallizable solid; luminous and phosphorescent in the dark; distinctive, disagreeable odor; exceedingly poisonous! (b) Bright reddish-brown, odorless, amorphous powder; nonpoisonous.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Black phosphorus (metallic phosphorus, Hittorf's phosphorus) is a denser allotropic form of yellow phosphorus, obtained by crystallizing the latter from molten lead. It is also obtained by heating red phosphorus in sealed tubes to 360°C. for a long time. Sp.gr. 2.32.

Constants:	(a)	(b)
Specific gravity	1.83	2.296
Melting-point	44.4°C.	725°C.
Boiling-point	287°C.	....
Flash-point	(a) Spontaneously ignites in air;	(b) Only ignites above 200°C.

(a) Soluble in carbon bisulfide, benzene and chloroform; slightly soluble in alcohol, ether and fixed oils.

(b) Soluble in absolute alcohol; insoluble in carbon bisulfide.

Derivation: (a) (1) Powdered calcined bones are digested with sulfuric acid, then heated to convert into calcium meta-phosphate, which is heated in a retort with carbon, yielding tricalcium phosphate and phosphorus which distills out.

(2) By heating bone-ash, or other phosphatic material in the electric furnace with silica and coke.

(b) By heating yellow phosphorus for 8 to 10 days under pressure in an inert atmosphere.

Method of purification: Distillation with moist sand.

Grades: Technical; U.S.P.

Containers: 1, 11 lb. tins; 80, 110 lb. cases.

Uses: (a) Match industry. Now prohibited in most countries (not in Italy); manufacture of rat poison; phosphor-bronze; production of phosphorus pentachloride and other compounds; medicine (treatment of diseases of the osseous tissues).

(b) Match industry instead of poisonous, yellow phosphorus; organic synthesis.

Fire hazard: Dangerous.* (a) Must be kept under water.

Railroad shipping regulations: Yellow label.

Phosphorus, Bolognian.

A phosphorescent barium sulfide containing some sulfate.

Derivation: By heating barium sulfate with powdered carbon.

Phosphorus Chloride. See Phosphorus trichloride.

Phosphorus Oxychloride (Phosphoryl chloride) $POCl_3$.

Color and properties: Colorless, fuming liquid.

Constants: Sp.gr. 1.71163; m.p. 1.25°C.; b.p. 107.2°C.

Decomposed by water and alcohol.

Derivation: By distilling phosphorus pentoxide with phosphorus pentachloride.

Grades: Technical.

Containers: 200, 650 lb. steel-jacketed lead cylinders; 85, 175 lb. carboys.

Uses: Chlorinating agent and as a catalyst in organic synthesis; manufacture of acetic and other anhydrides.

Railroad shipping regulations: White label.

Phosphorus Pentachloride (Phosphoric chloride; Phosphoric perchloride) PCl_5.

Color and properties: Slightly yellow, crystalline mass; irritating odor; fuming in moist air; strong irritating effect on the eyes.

Constants: Sp.gr. 3.60; m.p. (under pressure) 148°C. Ordinarily sublimes without melting; b.p. 160° to 165°C.

Soluble in carbon bisulfide; decomposed by water.

Derivation: By action of chlorine on phosphorus or phosphorus trichloride.

Grades: Technical.

Containers: 25, 50 lb. crocks.

Uses: Chlorinating agent in organic chemistry; catalyst.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Phosphorus Pentoxide. See Phosphoric acid, anhydrous.

Phosphorus Sesquisulfide (Tetraphosphorus trisulfide) P_4S_3.

Color and properties: Yellow, crystalline mass; very inflammable.

Constants: Sp.gr. 2.00; m.p. 172°C.; b.p. 407.8°C.

Soluble in carbon bisulfide; insoluble in cold water; decomposed by hot water.

Derivation: By gently heating phosphorus and sulfur.

Grades: Technical.

Containers: 105 lb. cases.

Uses: Organic synthesis; manufacture of matches.

Fire hazard: Dangerous.*

Railroad shipping regulations: None.*

Phosphorus Trichloride (Phosphorus chloride) PCl_3.

Color and properties: Clear, colorless fuming liquid; decomposes rapidly in moist air.

Constants: Sp.gr. 1.6128; m.p. —111.8°C.; b.p. 76°C.

Soluble in ether, benzene, carbon bisulfide and carbon tetrachloride; decomposed by water.

Derivation: By passing a current of dry chlorine over gently heated phosphorus which ignites. The trichloride, admixed with some pentachloride, distills over. A small amount of phosphorus is added and the whole distilled.

Grades: Technical.

Containers: 85, 175 lb. carboys; 200, 650 lb. steel-jacketed lead cylinders.

Uses: Chlorinating agent; solvent for phosphorus; iridescent metallic deposits; manufacture of saccharin.

Fire hazard: Dangerous.*

Railroad shipping regulations: White label.

Phosphoryl Chloride. See Phosphorus oxychloride.

Phosphotungstic Acid (Phosphowolframic acid) $P_2O_5 \cdot 12WO_3 \cdot 42H_2O$.

Color and properties: Heavy, greenish crystals.

Soluble in water, alcohol and ether.

Derivation: By heating ammonium phosphotungstate with aqua regia.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: Glass bottles.

Uses: Reagent for alkaloids.

Railroad shipping regulations: None.*

Phosphowolframic Acid. See Phosphotungstic acid.

Phosphuretted Hydrogen. See Phosphine.

Photal. Proprietary name for a photographic developer.

Photographic and Motion-picture Films. A film formed by pouring a solution of pyroxylin (q.v.) and camphor in an organic solvent onto a smooth surface and allowing it to evaporate. It must be entirely transparent, free from specks, and of a uniform thickness, about 0.005 of an inch.

Railroad shipping regulations: Motion picture film; yellow label.

Photographic Gelatin. See Glue and gelatin.

Photophor. See Calcium phosphide.

Photoxylin. See Celloidin.

Phthalein, Para-. See Phenolphthalein.

Phthalic Acid (Ortho-phthalic acid; Naphthalic acid) $C_6H_4(CO_2H)_2$.

Color and properties: Colorless crystals.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp. gr. 1.585; m.p. 213°C.
Soluble in alcohol; sparingly soluble in water and ether.
Derivation: (a) By oxidizing naphthalene with fuming sulfuric acid in presence of cerium or thorium salts which act catalytically. (b) By electrolysis of naphthalene in presence of an acid solution of a cerium compound.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; 50 lb. cases; 100 lb. barrels.
Uses: Dyes (synthesis of indigo, manufacture of phthaleins, various fluorescein and eosin dyes, rhodamines and pyronine dyes); medicine; phenolphthalein; phthalated urotropine; phthalotropin; styptol; phthalimide; anthranilic acid; synthetic perfumes.
Railroad shipping regulations: None.*

Phthalic Acid, Ortho-. See Phthalic acid.

Phthalic Anhydride (Acid phthalic anhydride) $C_6H_4(CO)_2O$.
Color and properties: White, crystalline needles; sublimes below boiling-point; characteristic odor.
Constants: Sp.gr. 1.527; m.p. 128°C.; b.p. 284.5°C.
Soluble in alcohol; slightly soluble in ether and hot water.
Derivation: By air oxidation of naphthalene using vanadium as a catalyst.
Method of purification: Sublimation.
Grades: Technical; pure.
Containers: 100 lb. kegs; 80, 175, 200 lb. barrels.
Uses: Manufacture of phenolphthalein and other phthaleins, eosin dyes, phthalimide and anthranilic acid; organic synthesis.
Railroad shipping regulations: None.*

Phthalimide, Ortho- $C_6H_4(CO)_2NH$.
Color and properties: White, crystalline leaflets.
Constants: M.p. 233.5°C.; b.p.: Sublimes.
Slightly soluble in ether; insoluble in benzene.
Derivation: By dissolving phthalic anhydride in ammonium hydroxide, evaporating to dryness and fusing the residue.
Method of purification: Sublimation.
Grades: Technical.
Containers: Barrels; tins.
Uses: Production of indigo, via anthranilic acid; organic synthesis.
Railroad shipping regulations: None.*

Phyllite. See Micas, brittle.

Physostigma (Eserine; Calabar bean; Ordeal bean; Chop nut; Split nut).
Derivation: Seed of Physostigma venenosum.
Habitat: West Africa.
Grades: Technical (salicylate sulfate).
Containers: Bags.
Uses: Medicine; source of the alkaloid physostigmine or eserine used in salts.
Railroad shipping regulations: None.*

Physostigmine (Eserine; Calabarine).
(a) Alkaloid $C_{15}H_{21}O_2N_3$; (b) Salicylate $C_{15}H_{21}O_2N_3C_7H_6O_3$; (c) Sulfate $(C_{15}H_{21}O_2N_3)_2H_2SO_4$.
Color and properties: (a) Colorless or pinkish crystals. Poisonous! (b) Colorless or faintly yellow, shining, odorless, crystals. Becomes reddish on long exposure to light and air. Very poisonous! (c) Minute white crystals. Becomes yellowish on long exposure to light and air. Deliquescent. Poisonous!
Constants: (a) M.p. 86 to 87°C. (unstable crystals) and 105° to 106°C. (stable crystals). (b) M.p. 182° to 183°C. (c) M.p. 150° to 151°C.
(a) Slightly soluble in water, soluble in alcohol and diluted acids. (b) Soluble in water, alcohol, chloroform; less so in ether. (c) Soluble in water, alcohol, chloroform; less so in ether.
Derivation: (a) By solvent extraction from the seeds of Physostigma venenosum. (b) By adding sodium salicylate to the ethereal extraction of Physostigmine. (c) By adding sulfuric acid to the ethereal extraction of Physostigmine.
Method of purification: Crystallization.
Grades: (b) U.S.P.
Containers: ⅛, ¼, 1 oz. vials; 1, 2, 3, 5, 10, 15 grain vials.
Uses: (a) Source of (b) and (c). (b) Medicine (contracts pupil of the eye; intestinal muscle stimulant; sedative to spinal cord). (c) The same as (b).
Railroad shipping regulations: None.*

Phytolacca (Poke root; Garget).
Dried root of Phytolacca americana or decandra.
Habitat: North America; southern Europe.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (as an emetic and purgative; somewhat narcotic).
Railroad shipping regulations: None.*

Pichi.
Leaves, branches and wood of Fabiana imbricata.
Habitat: Chile and Peru.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Picked Turkey Gum. See Arabic gum.

Pickling Acid. Sulfuric acid, usually 60°Bé. used for treating iron and steel wire, plates, etc.

Picoline (Alpha-methylpyridine) $C_5H_4N(CH_3)$.
Color and properties: Colorless liquid.
Constants: Sp.gr. 0.952.
Miscible with water, alcohol.
Derivation: Dry distillation of bones or coal.
Uses: Medicine (nerve sedative).
Railroad shipping regulations: None.*

Picotite. See Spinel.

Picramic Acid (Picraminic acid; Dinitroaminophenol) $C_6H_2(NO_2)_2(NH_2)OH$.
Color and properties: Red crystals.
Constants: M.p. 168°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By partial reduction of picric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: 100 lb. kegs.; 300 lb. barrels.
Uses: Azo dyes.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Picraminic Acid. See Picramic acid.

Picratol (Silver Picrate) $C_6H_2O(NO_2)_3Ag.H_2O$.
Color and properties: Yellow crystals, containing 30% silver.
Soluble in water.
Uses: Medicine (astringent, antiseptic, inflammation of mucous membrane, gonorrhea, unofficial).
Railroad shipping regulations: None(?)*

Picric Acid (Picronitric acid; Trinitrophenol; Carbazotic acid; Phenoltrinitrate) $C_6H_2(NO_2)_3OH$.
Color and properties: Yellow crystals; very poisonous!; explosive especially in contact with metals or metallic oxides.
Constants: Sp.gr. 1.767; m.p. 122°C.
Soluble in water, alcohol, chloroform, benzene and ether.
Derivation: By the nitration of phenolsulfonic acid, obtained by heating phenol with concentrated sulfuric acid.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300 lb. barrels.
Uses: Explosives; medicine (astringent, germicide, dressing burns); dyes (starting point in

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

manufacture of nigrosine and induline dyes, as well as substantive cotton dyes); textiles (dye in producing bright yellow shades on the animal fibers, silk and wool and in dyeing and printing processes; dyeing and printing textile fabrics with compound dyes which contain also such dyes as benzaldehyde green, methyl violet and indigo carmine); picrates.

Fire hazard: Dangerous.*

Railroad shipping regulations: High explosive.

Picronitric Acid. See Picric acid.

Picrolite. See Serpentine.

Picrorhiza.

Dried rhizome indigenous to the Himalayas; used in medicine as a bitter tonic with laxative action.

Pictet's Liquid.

A liquid used for producing low temperature. It is stated to be mixture of liquid carbon dioxide and sulfur dioxide.

Piedmontite $Ca_2(AlOH)(AlMn)_2(SiO_4)_3$.

One of the epidote (q.v.) group of minerals. Color, reddish-brown or black.

Constants: Sp.gr. 3.404; hardness 6.5.

Occurrence: United States (Pennsylvania), Italy, France, Japan, Egypt.

Pigments.

Blacks: Lampblack, carbon black, graphite, charcoal, vine black, ivory black, extract of ivory black, drop black, black toner, benzene black, acetylene black, mineral black.

Blues: Ultramarine blue, cobalt blue (Thénard's blue, cobalt ultramarine, King's blue, Leyden blue), artificial cobalt blue, Prussian blues (steel blue, milori blue, bronze blue, Antwerp blue, Chinese blue, Paris blue, Berlin blue, Turnbull's blue), smalt, mountain blue, Bremen blue.

Browns: Burnt sienna, burnt umber, burnt ocher, Prince's metallic or mineral brown, Van Dyke brown, sepia, Mars brown.

Greens: Chrome greens (Guignet's green, chromium oxide), green alkaline lakes, zinc green, verte antique (copper green), ultramarine green, mountain green (malachite green, mineral green), verdigris, Scheele's green, Paris (emerald) green, terra verde, Brunswick green (green verditer), Rinmann's green.

Oranges: Orange mineral, chrome orange, antimony orange, Mars orange.

Purple: Purple of Cassius.

Reds: Venetian red, Indian red, light red (brun rouge, burnt ocher), rouge (see also ochers), quicksilver vermilion (Chinese vermilion), permanent vermilion, helio fast red (Harrison red), lithol red, red lead, chrome red (Chinese red, American vermilion, Austrian cinnabar, Derby red, Persian red, Victoria red), realgar, antimony red (antimony vermilion), Mars red, Van Dyke red.

Whites: White lead, sublimed white lead, zinc lead white, Ozark white, zinc oxide (Chinese white), zinox, lithopone, zinc sulfide, antimony white.

Yellows: Ocher, chrome yellows (Leipzig yellow, Cologne yellow, Paris yellow, primrose chrome, pale chrome, middle chrome, deep chrome, citron yellow, lemon chrome, baryta yellow, permanent yellow, yellow ultramarine, Steinbüller yellow, jaune d'Outremer), orpiment (royal yellow, King's yellow), litharge, gamboge, indian yellows, Mars yellow, Turner's yellow (Cassel yellow, Montpellier yellow, Verona yellow), cadmium yellow (orange cadmium, Orient yellow, aurora yellow), antimony yellow (Naples yellow).

See also under each specific pigment.

Pig-wrack. See Chondrus.

Pill-bearing Spurge. See Euphorbia pilulifera.

Pilocarpine $C_{11}H_{16}N_2O_2$.

Color and properties: Colorless or yellow, hygroscopic, needle-like crystals; very poisonous!

Constants: M.p. 34°C.

Soluble in water, alcohol and chloroform; slightly soluble in ether.

Derivation: Alkaloid from the leaves of Pilocarpus jaborandi or Pilocarpus microphyllus.

Method of purification: Crystallization.

Grades: Technical; U.S.P. (hydrochloride, nitrate).

Containers: ⅛, 1 oz., 5, 10, 15 grain vials.

Uses: Medicine (sudorific, opposed in action to atropine); hair pomades and tonics. Usually used in the form of the hydrochloride, nitrate or other salt.

Railroad shipping regulations: None.*

Pilocarpus (Jaborandi).

Color and properties: Yellowish-green leaflets; bitterish, slightly salty, aromatic taste.

Chief constituents: Pilocarpine, a volatile oil, jaborine, and pilocarpidine.

Derivation: The dried leaflets of Pilocarpus jaborandi or P. microphyllus; habitat: Brazil and Paraguay.

Grades: Pernambuco; Maranham.

Containers: Boxes; bales.

Uses: Medicine; source of pilocarpine.

Railroad shipping regulations: None.*

Pimenta (Pimento; Jamaica pepper; Allspice).

Color and properties: Dark brown berries or powder. The odor is thought to resemble that of a mixture of cinnamon, cloves and nutmeg, hence the name allspice.

Derivation: The dried, nearly ripe fruit of Pimenta officinalis; habitat: East Indies; West Indies; Central America; South America.

Grades: Technical; N.F.

Containers: Tins; wooden boxes.

Uses: Perfumery; condiment.

Railroad shipping regulations: None.*

Pimenta Oil. See Allspice oil.

Pimento. See Pimenta.

Pimento Oil. See Allspice oil.

Pinchbeck. An alloy of copper and zinc, containing more zinc than in brass, resembling gold in appearance.

Pine-cone Oil.

Color and properties: Colorless essential oil; agreeable odor somewhat suggestive of oranges and lemons.

Chief known constituents: Pinene, limonene, bornyl acetate.

Constants: Sp.gr. 0.851 to 0.870 at 15°C.; optical rotation —60° to —84°; ester content (bornyl acetate) 0 to 6.

Solubility in alcohol: In 5 to 8 vols. of 90% alcohol.

Derivation: Distilled from the cones of Abies alba native to Switzerland and Thuringia.

Uses: Perfumery; medicine.

Railroad shipping regulations: None.*

Pine-needle Oils (Pine oil; Firwood oil; Douglas-fir oil).

Derived from Abies alba.

Color and properties: Colorless essential oil; agreeable balsamic odor.

Chief known constituents: Pinene, limonene, lauric aldehyde.

Constants: Sp.gr. 0.867 to 0.886 at 15°C.; optical rotation —30° to —60°; refractive index 1.473 to 1.476; acid value 0 to 2.0; ester content (bornyl acetate) 4.5 to 11.

Solubility in alcohol: In 4 to 7 vols. and more of 90% alcohol.

Production center: Switzerland, Tyrol, lower

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Austria, Thuringia, Black Forest. Oil known locally as Edeltannennadelöl.

Derived from Pinus montana.

Color and properties: Colorless essential oil; agreeable balsamic odor.

Chief known constituents: Phellandrene, bornyl acetate, cadinene, pumilone.

Constants: Sp.gr. 0.860 to 0.875 at 15°C.; optical rotation —4° 30′ to —9° (occasionally —15° 20′); refractive index 1.475 to 1.480; acid value to 1.0; ester content (bornyl acetate) 3 to 8.

Solubility in alcohol: In 4.5 to 8 vols. and more of 90% alcohol.

Adulteration: Turpentine oil.

Production center: Austrian alps, especially Tyrol, northern border of Steiermark, Tatra Mountains. Oil known locally as Latschenkieferöl or Krummholzöl.

Derived from Abies sibirica.

Color and properties: Colorless or pale yellow essential oil; aromatic odor; pungent taste.

Chief known constituents: Pinene, dipentene, camphene, phellandrene, bornyl acetate.

Constants: Sp.gr. 0.905 to 0.925 at 15°C.; optical rotation —37° to —43°; refractive index 1.470 to 1.472; acid value to 2.5; ester content (bornyl acetate) 29 to 40.

Solubility in alcohol: In 10 to 14 vols. of 80% alcohol; in 0.5 to 1 vol. of 90% alcohol.

Production center: Northeast Russia, occasionally Siberia. Oil commonly known as Siberian fir-needle oil; also as oleum abietis.

Derived from the Douglas fir.

Color and properties: Greenish-yellow essential oil; limonene-like odor.

Chief known constituents: Terpenes.

Constants: Sp.gr. 0.8680 at 23°C.; optical rotation —62.5°; acid value 0; saponification value 86.6 (=30.3% bornyl acetate); after acetylation, 92.1 (=27.2% borneol).

The Douglas fir is found in the coniferous forests of North America.

Derived from the Swedish variety of Pinus silvestris.

Chief constituents: Pinene; sylvestrene; an undetermined ester.

Constants: Sp.gr. 0.872 at 15°C.; optical rotation +10° 40′.

Common commercial name: Schwedisches Fichtennadelöl.

Containers: Glass bottles; drums.

Uses: Perfumery; medicine.

Railroad shipping regulations: None.*

Pine Oil. See Pine-cone oil, also Pine-needle oils.

Pine Resin. See Colophony.

Pine Tar (Stockholm tar; Pix pini).

Color and properties: A very viscid, blackish-brown liquid with characteristic odor and taste.

Soluble in alcohol, ether, chloroform, glacial acetic acid, fixed and volatile oils.

Derivation: Destructive distillation of pine wood.

Chief constituents: Phenol.

Grades: U.S.P.

Uses: Medicine (as a stimulating expectorant); disinfectant; flotation of ores; roofing compositions; roof cements; lubricant; tar paints and stains.

Pine-tar Oil. See Tar oil, wood.

Pine-tar Pitch.

The residue from distillation of pine-tar oil from pine tar. Similar to coal-tar pitch.

Pine Tulip. See Chimaphila.

Pinene (Australene; Laurene; Terebenthene; Camphor) $C_{10}H_{16}$.

Color and properties: Colorless, transparent liquid, the chief constituent of oil of turpentine and present in many essential oils.

Constants: Sp.gr. 0.8587; b.p. 156°C. Ordinary pinene (alpha-pinene) is usually accompanied by its isomer, beta-pinene, b.p. 163°C.

Soluble in alcohol, ether and chloroform; very slightly soluble in water.

Derivation: From oil of turpentine by fractionation.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums.

Uses: Manufacture of artificial camphor, terpin hydrate, and terpineol.

Railroad shipping regulations: None.*

Pinene Hydrochloride. See Terpene hydrochloride.

Pink Root. See Spigelia.

Pink Salt. See Stannic chloride.

Pintsch Gas.

A gas formed by decomposing oil in retorts, purifying the gas and compressing it at pressures from 10 to 14 atmospheres. A typical gas will analyze 30.0% illuminants, 0.1% carbon monoxide, 13.2% hydrogen, 45.0% methane, 9.0% ethane, 0.2% carbon dioxide, 1.6% nitrogen. Candle power 43.0; B.t.u. 1,276.

Uses: Railroad illuminating gas; buoy illuminating gas; industrial heating; domestic illumination and heating.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red gas label.

Pipe Clay. See under Clays.

Piper (Pepper).

Black pepper: The dried unripe fruit of Piper nigrum, L.

Habitat: India, Malabar coast, Philippines, Sumatra, Java, Ceylon, Borneo.

White pepper: The fully matured fruit deprived of their outer shell.

Long pepper: The fruit of Piper officinarum, DC., and Piper longum, L. Odor and flavor resembles that of ordinary pepper but is milder and less pleasant.

Habitat: Malay archipelago, India, Philippines, Ceylon.

Composition of black and white pepper †:

	Black Pepper	White Pepper
	Per Cent	
Water	8.0 to 11.0	8.0 to 11.0
Ash	2.75 to 5.0	1.0 to 2.0
Volatile oil	0.50 to 1.75	0.5 to 1.75
Piperine and resin	7.0 to 8.0	7.0 to 8.0
Starch	32.0 to 38.0	40.0 to 44.0
Crude fiber	8.0 to 11.0	4.11 to 8.0
Albuminoids	7.0 to 12.0	8.0 to 10.0

† United States Department of Agriculture, Bureau of Chemistry Bulletin 13, II. 206.

Adulterants:

The following have been noted at one time or another: Rice starch, ground olive stones, kaolin, pepper husks, spent ginger, mustard seed hulls, linseed meal, ground almond shells.

Uses: Condiment; medicine; pepper oil.

Railroad shipping regulations: None.*

Piperazidine. See Piperazine.

Piperazine (Diethylenediamine; Pyrazine hexahydride; Piperazidine; Ethyleneimine) $NH(CH_2)_2.(CH_2)_2NH$.

Color and properties: Colorless, deliquescent, transparent, needle-like crystals, which absorb carbon dioxide from the air. Keep well stoppered.

Constants: M.p. 104° to 107°C.; b.p. 145°C.

Soluble in water and alcohol.

Derivation: Treatment of ethylene bromide or chloride with alcoholic ammonia at 100°C.

Method of purification: Crystallization.

Grades: Technical.

Containers: ½, 1 oz. glass bottles.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Medicine (unofficial, with doubtful value).
Railroad shipping regulations: None.*

Piperazine Ichthyolate. See Ichthyolidin.

Piperazine Quinate. See Sidonal.

Piperonal. See Heliotropin.

Piperonyl Aldehyde. See Heliotropin.

Pipsissewa. See Chimaphila.

Pisanite. An iron sulfate containing copper found in Montana. $(FeCu)SO_4.7H_2O$.

Pisolite. See Aragonite.

Pissaphalt. See Maltha.

Pistachia Galls. See Mastic gum.

Pistacia. See Mastic gum.

Pitayin. See Quinidine.

Pitch. Thick, tenacious, dark-colored bituminous substances, secured either as the result of industrial distillation processes, or as deposits on the earth's surface. They are usually insoluble in water, miscible with carbon bisulfide and benzene and have characteristic "tarry" odors.
Railroad shipping regulations: None.*
See Pitch, native and Pitch, artificial.

Pitch, Candle. See Stearin and fatty acid pitches.

Pitch Coal (Specular coal). A variety found alone but sometimes as streaks in the seams of common brown coal or the earthy brown coal beds. It is dark brown to pitch-black in color, with a waxy luster.
Railroad shipping regulations: None.*

Pitch, Jew's. See Asphalt.

Pitch, Judean. See Asphalt.

Pitch, Mineral. See Asphalt.

Pitch, Native.
Natural pitches are usually known as mineral pitches or asphalts. See Asphalt, Asphaltite, and Asphaltic pyrobitumen.

Pitch, Stearin. See Stearin and fatty acid pitches.

Pitch, Stockholm. A wood-tar pitch.

Pitch, Straight-run. A pitch, run in the initial process of distillation, to the consistency desired, with subsequent fluxing.
Railroad shipping regulations: None.*

Pitches, Artificial.
These pitches are usually named by the source from which derived. They may be divided into four general groups:
(a) Residues from the distillation or oxidation of mineral oils. Petroleum pitch and blown asphalt (q.v.) are representative of this class.
(b) Residues from the distillation of tars. Coal-tar pitch, brown coal-tar pitch, coke-oven-tar pitch, blast-furnace-tar pitch, water-gas-tar pitch, generator-gas-tar pitch, wood-tar pitch, pine-tar pitch are representative of this class.
(c) Residues from the distillation of fusible organic substances, the process having been terminated before the actual formation of coke. Resin pitch and fatty-acid pitches (q.v.) are representative of this class.
(d) Various artificial mixtures having the general properties given in the definition of pitch (q.v.). Roofing pitch, brewer's pitch, and insulating pitch are representative of this class.
Railroad shipping regulations: None.*

Pitchblend.
A massive variety of uraninite (q.v.) but contains no thoria and the rare earths are also absent.
Constants: Sp.gr. not above 6.5.

Pittsburgh Flux. See Sulfurized asphalts.

Pituitary. The dried, cleaned, powdered posterior lobe obtained from the pituitary body of domesticated animals which are used for food by man. A yellow or grayish amorphous powder with characteristic odor.
Partially soluble in water.
Used in medicine as a muscular stimulant and to increase secretions of the kidney and the mammary glands.

Piuri. See Indian yellow.

Pix. Pitch.

Pix Pini. See Pine tar.

Plagionite.
Dark, lead-gray secondary mineral formed in lead and antimony veins.
Constants: Sp.gr. 5.3 to 6.5; hardness 2.5 to 3.5.
Occurrence: Germany.

Plasma.
A form of native silica or quartz (q.v.). Color: leek to bright green, sometimes almost emerald green. Subtranslucent or slightly translucent.

Plaster.
(a) A paste made by mixing together varying proportions of lime, sand and water, together with hair or other binding material. Used as a surface coating for walls, ceilings and partitions in buildings.
(b) Plaster of Paris (q.v.), usually used for ornamental or intricate parts of plaster work.

Plaster Cement. See under Cements, structural, Le Sage cement.

Plaster, Hard-finished.
Plaster made from over-burnt gypsum, which is dipped in alum solution and calcined a second time.

Plaster of Paris $(CaSO_4)_2.H_2O$.
Color and properties: White powder, or colored slightly due to impurities.
Derivation: By heating gypsum between 300° and 395°F. until three quarters of the water of crystallization is driven off. When the plaster is required to be slow-setting retarders are added such as glue, sawdust, blood, packing house tankage or hair digested with caustic soda. If a very quick-setting plaster is desired, accelerators are added such as common salt, sodium sulfate and soda ash.
Uses: Building; fertilizer; paper; paint and varnish.
Railroad shipping regulations: None.*

Plaster Retarders.
Substances used to slow up the setting of plaster. Blood, glue, dextrin, and hair are among those used.

Plastic Clay. See under Clays.

Plastoflex. A proprietary name for a plasticizer for artificial leather and celluloid.

Plastols. Trade name for a series of white, solid, camphor-like products. When used instead of camphor the plastols are said to give similar solidity and elasticity to cellulose esters. They can be exposed to light and are soluble in alcohol and in most of the usual solvents, and gelatinize nitrocellulose.
Marketed as follows:
Plastol Va: Sp.gr. 0.822 (25°C.); solidification point 42.2°C.; b.p. 200° to 220°C. (7 mm.).
Plastol Vb: Sp.gr. 0.874 (25°C.); solidification point 34.6°C.; b.p. 195° to 210°C. (7 mm.).
Plastol CII: Sp.gr. 1.305 (25°C.); solidification point 8.5°C.; b.p. 216°C. (7 mm.).
Plastol M: Sp.gr. 0.826 (25°C.); solidification point 40.8°C.; b.p. 200° to 210°C. (7 mm.).

Platinic Chloride. See Platinum chloride.

Platinite. See Ferronickel alloys.

Platinous Chloride. See Platinum bichloride.

Platinum Pt.
Color and properties: Dull, silvery, malleable, ductile metal; unaffected by moist air or ordinary

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

reagents; somewhat softer than silver. Found in nature alloyed with iridium, rhodium, palladium, and sometimes with iron and gold. Ural region of Russia, Colombia, Borneo, Alaska, California, Oregon, New South Wales, Tasmania, Nevada, Washington.
Constants: Sp.gr. 21.16; m.p. 1,753°C.
Soluble in aqua regia and fused alkali; insoluble in water and ordinary acids and alkalis.
Derivation: By solution of metalliferous sands in aqua regia, precipitation of the insoluble ammonium chloroplatinate, conversion of latter by ignition into platinum sponge, which is converted into the massive metal by melting in the oxy-hydrogen flame.
Method of purification: Repetition of the above process.
Impurities: Iridium; iron.
Forms available: Plate, sheet, wire, button, tubing, foil, gauze, perforated sheet, sponge, black, anodes.
Uses:
Chemical Applications: Manufacture of platinum salts, catalyzer, platinum asbestos.
Laboratory and Plant Equipment: Laboratory ware, retorts, concentrating stills, nozzles and sprayer tips, ammonia-oxidation equipment, tubing, rayon spinnerets, special apparatus.
Electrical Equipment: Resistance wire, ignition fuses, contact points, contacts and discs, radio-tube filaments.
Miscellaneous Uses: Jewelry, dentistry, pen tips, hypodermic needles (alloyed with iridium).

Platinum-ammonium Chloride (Ammonium chloroplatinate) $PtCl_2.2NH_4Cl$.
Color and properties: Dark ruby-red crystals.
Constants: M.p.: Decomposes.
Soluble in water.
Derivation: By the addition of ammonium hydroxide to chloroplatinic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Photography.
Railroad shipping regulations: None.*

Platinum Bichloride (Platinous chloride; Platinum dichloride) $PtCl_2$.
Color and properties: Greenish-gray powder which forms double salts with the chlorides of the alkali metals.
Constants: Sp.gr. 5.87; m.p.: Is decomposed at red-heat yielding platinum.
Soluble in hydrochloric acid and ammonium hydroxide; insoluble in water.
Derivation: (a) By heating platinum sponge in presence of dry chlorine; (b) by heating chloroplatinic acid to 200°C.
Grades: Technical.
Containers: Glass bottles.
Uses: Platinum salts.
Railroad shipping regulations: None.*

Platinum Black (Platinum mohr; Platinum sponge).
Color and properties: Black powder; exhibits a metallic luster when rubbed.
Constants: Sp.gr. 15.8 to 17.6.
Soluble in aqua regia.
Derivation: Reduction of solution of a platinum salt with zinc or magnesium.
Grades: Technical.
Containers: Glass bottles.
Uses: Catalyst; oxidizing agent in organic chemistry; arbsorbent of gases (hydrogen, oxygen, etc.) which it again liberates at red-heat; gas ignition apparatus.
Railroad shipping regulations: None.*

Platinum Chloride (Platinum tetrachloride; Platinic chloride) (a) $PtCl_4$; (b) $PtCl_4.5H_2O$.
Color and properties: (a) Brown solid; (b) Red crystals.

Constants:	(a)	(b)
Specific gravity	.....	2.43
Melting-point	Decomposes	Loses $4H_2O$ at 100°C.

Soluble in alcohol and water.
Derivation: By solution of platinum in aqua regia and evaporation.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical reagent.
Railroad shipping regulations: None.*
Note: The platinum chloride of commerce is usually chloroplatinic acid.

Platinum Dichloride. See Platinum bichloride.

Platinum, Mohr. See Platinum black.

Platinum-Potassium Chloride. See Potassium chloroplatinate.

Platinum Sponge Pt.
Color and properties: A grayish-black, porous mass.
Soluble in aqua regia.
Derivation: By the ignition of platinum-ammonium chloride.
Grades: Technical.
Containers: Glass bottles.
Uses: Catalyst; ignition of hydrogen in Doebereiner lamps, illuminating gas, etc.
Railroad shipping regulations: None.*

Platinum Tetrachloride. See Platinum chloride.

Pleonaste. See Spinel.

Plessy's Green.
Color and properties: A deep green pigment which is both stable towards chemical reagents and durable towards atmospheric influences. It consists of chromium phosphate mixed with variable amounts of chromium oxide and calcium phosphate.
Derivation: By boiling a solution of 1 part potassium bichromate in 10 parts water with 3 parts of a solution of acid calcium phosphate and 1 part sugar.

Pleurisy Root. See Asclepias.

Plumbago. See Graphite.

Plumbers' Furnace Gasoline.
One of 66° to 68°Bé. gravity.

Plumbic Acid, Anhydrous. See Lead oxide, brown.

Plumbojarosite. A natural hydrous sulfate of lead and iron found in New Mexico and Utah, $PbFe_6(OH)_{12}(SO_4)_4$.

Plumbo-plumbic Oxide. See Lead oxide, red.

Plumbum. The Latin name for lead, hence the symbol Pb in chemical nomenclature and the names plumbic and plumbous, as: Plumbic sulfite and Plumbous oxide, etc.

Plumbus Oxide. See Litharge.

Plumbus Sulfide. See Lead sulfide.

Pneumatic Tool Oil.
Two suitable oils have the following constants:

Gravity °Bé.	Flash point °F.	Fire test °F.	Cold test °F.	Saybolt viscosity
32	400	460	20	145
34	340	400	20	80

Railroad shipping regulations: None.*

Podophyllin (Resin podophyllum).
Color and properties: Light yellow powder or small yellow, bulky, fragile lumps; bitter acrid taste; the dust is very irritating to the eyes and the mucous membranes.
Chief known constituents: Podophyllotoxin, picropodophyllin, etc.
Soluble in alcohol, ether, ammonium hydroxide, chloroform, potassium hydroxide solution and sodium hydroxide solution.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Extraction of the rhizome or roots of Podophyllum peltatum with alcohol.
Grades: Technical.
Containers: 1, 5, 10 lb. glass bottles.
Uses: Medicine (cathartic).
Railroad shipping regulations: None.*

Podophyllum (May-apple; Mandrake; Devil's apple; Indian apple; Vegetable calomel).
Dried rhizome and roots of Podophyllum peltatum.
Habitat: North America, China, Himalayas.
Grades: Technical; U.S.P.
Containers: 100 lb. bags; various size bags.
Uses: Medicine (cathartic).
Railroad shipping regulations: None.*

Podophyllum Resin. See Podophyllin.

Pogy Oil. See Menhaden oil.

Poison Black Cherry. See Belladonna.

Poison Hemlock. See Conium.

Poison Ivy. See Rhus toxicodendron.

Poison Nut. See **Nux vomica.**

Poison Oak. See Rhus toxicodendron.

Poison Parsley. See Conium.

Poison Tobacco. See Hyoscyamus.

Poison Vine. See Rhus toxicodendron.

Poke Root. See Phytolacca.

Polianite MnO_2.
Light steel-colored or iron-gray mineral, black streak, metallic luster. Distinguished from pyrolusite (q.v.) by its hardness and anhydrous character. Contains 63.1% manganese.
Constants: Sp.gr. 4.83 to 5.02; hardness 6 to 6.5.
Occurrence: Bohemia (In other localities is often wholely or partly changed to pyrolusite).

Polish Blistering Flies. See Cantharides.

Polishing Acids. Oxalic, hydrochloric, nitric or sulfuric acid.

Polishing Crocus. See Ferric oxide, red.

Polishing Oil. (a) A term sometimes used in the petroleum industry to designate that fraction of b.p. 130° to 160°C. (b) A non-viscous neutral oil identical with concrete form oil.
Uses: Turpentine substitute.
Railroad shipping regulations: None.*

Pollantin. An antitoxin for hay-fever, prepared from the pollen of golden-rod and other plants.

Pollapas. A trade name for a glass substitute. Transparent, colorless, solid material resembling rock crystal or flint glass, said to be made by combination of urea and formaldehyde.

Pollards.
A term used in flour-milling. Synonymous with shorts (q.v.), which is the term more commonly used.

Pollucite. A complex silicate containing cesium, occurring in pegmatite in Maine, $H_2O(CsNa)_2O.Al_2O_3.5SiO_2$.

Polybasite.
A soft, iron-black mineral of metallic luster. Thin splinters are cherry red by transmitted light. Streak, black. Contains 75.6% silver, 9.4% antimony, 15.0% sulfur with partial replacement of silver by copper, and antimony by arsenic. Various formulas have been suggested, e.g.—Ag_9SbS_6, $9Ag_2S.Sb_2S_3$, $(Ag.Cu)_2SbS_6$. Soluble in nitric acid.
Constants: Sp.gr. 6 to 6.2; hardness 2 to 3.
Occurrence: United States (Colorado, Nevada, Montana, Arizona), Mexico, Chile, Germany, Bohemia, Sardinia.

Polycrase.
One of the rare earth minerals. The Norwegian variety contains: 20.35% columbium oxide, 4.00% tantalum oxide, 26.59% titanium oxide, 23.32% yttria, 7.53% erbia, 2.61% ceria, 7.70% uranium oxide, 2.72% iron oxide. Color, black, brownish in splinters; luster, vitreous to resinous.
Constants: Sp.gr. 4.97 to 5.04; hardness 5 to 6.
Occurrence: United States (North and South Carolina), Canada, Norway, Sweden.

Polymerized Oil. See Blown oil.

Polyzime (Polyzime "P"). Proprietary name for an amylolytic enzyme preparation from the growth of Aspergillus oryzae.
Color and properties: Thin liquid, sp.gr. 1.06 (Polyzime "P" is a yellow powder) optimum effect at 82°C. and pH 5.4.
Soluble in water.
Derivation: Sterile cereal media are inoculated with Aspergillus oryzae. After 48 hours the enzymes are extracted.
Uses: Warp desizing and making up colors for calico printing.
Railroad shipping regulations: None.*
See also Taka-diastase.

Polyzime "P." See Polyzime.

Pomegranate Bark. See Granatum.

Pompeian Red.
A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Pontianak Gum (Jelutong).
Derivation: From species of Dyera indigenous to Malacca and Borneo and from the guayule from Parthenium, a shrub indigenous to the Chihuahuan Desert of Mexico.
Grades: Technical.
Containers: Bags.
Uses: Rubber manufacture; chewing gum.
Railroad shipping regulations: None.*

Poppy Capsules. See Papaver.

Poppy Heads. See Papaver.

Poppy Heads, Leaves, Seeds and Flowers. See Papaver.

Poppy Oil (Poppy-seed oil).
Color and properties: Very pale golden yellow, odorless liquid; pleasant taste.
Constants: Sp.gr. 0.924 to 0.928; saponification value 189 to 196; iodine value 153 to 157; refractive index 1.4751 to 1.4773.
Soluble in ether, chloroform, petroleum ether, and carbon bisulfide.
Derivation: By expressing the seed of the poppy, Papaver somniferum, Papaver album and Papaver nigrum.
Method of purification: Filtration.
Grades: Crude; red; white.
Containers: Barrels.
Uses: Food oil; artist's colors; adulterant for olive oil; soap-stock; varnishes.
Railroad shipping regulations: None.*

Poppy-seed Oil. See Poppy oil.

Porcelain Clay. See Kaolin.

Porpezite. See Electrum.

Porpoise-blubber Oil. See Porpoise oil, body.

Porpoise Oil, Body (Dolphin oil; Porpoise-blubber oil).
Color and properties: Pale yellow liquid.
Constants: Sp.gr. 0.9273; saponification value 216; iodine value 103; refractive index 1.4688.
Soluble in ether, chloroform, benzine and carbon bisulfide.
Derivation: By boiling the body-blubber of the brown porpoise.
Method of purification: Filtration.
Grades: Technical.
Containers: Wooden barrels.
Uses: Lubricant; soap-stock; leather dressing; illumination.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Porpoise Oil, Jaw.

Color and properties: Pale yellow liquid.

Constants: Sp.gr. 0.9292; iodine value 27.4; refractive index 1.4494.

Soluble in ether, chloroform, benzine and carbon bisulfide.

Derivation: By boiling the jaw-blubber of the brown porpoise.

Method of purification: Filtration.

Grades: Technical.

Containers: Wooden barrels.

Uses: Lubricant for watches, chronometers, etc.

Railroad shipping regulations: None.*

Porpoise Oil, Junk.

Color and properties: Pale yellow liquid.

Constants: Sp.gr. 0.9260; iodine value 22.4; refractive index 1.4485.

Soluble in ether, chloroform, benzine and carbon bisulfide.

Derivation: By boiling the face-blubber of the brown porpoise.

Grades: Technical.

Containers: Wooden barrels.

Uses: Lubricant; leather dressing.

Railroad shipping regulations: None.*

Portland Cement. See under Cements, constructional.

Portugal Oil. See Neroli oil, Portugal and Orange peel oil, sweet.

Portugal Orange. See Orange peel, sweet.

Potash.

It is customary to express the potassium content of compounds as equivalents of the oxide, K_2O, known to the trade as potash. The term potash is also sometimes applied to potassium carbonate; caustic potash refers to potassium hydroxide.

Prior to the war Germany held an almost complete monopoly on the world's trade in potash because it possessed the only known large deposits of soluble potash salts, located in the vicinity of Stassfurt, Germany, and Mulhausen, Alsace. With France now in possession of Alsace there is sharp competition between these two sources.

As a result of the shortage and high prices for potash salts, the American potash industry was developed. The main sources of supply are as follows:

Natural salts and brines: The first large production came from the alkali lakes in Nebraska. The brine of these lakes contains mixed sulfates, carbonates and chlorides of potassium. Later developments are in Searles Lake, Calif., and the Salduro Salt Marsh, Utah. Recent drilling of the Texas-New Mexico salt beds have disclosed valuable deposits of potash-bearing minerals (sulfates).

Alunite: A double potassium-aluminum sulfate which is decomposed by heat into soluble potassium salts and insoluble aluminum salts. The only commercial production has come from Marysvale, Utah.

Dust from cement mills: The flue dust from Portland cement mills is collected by means of an electrostatic dust precipitator. 12,652 tons of crude dust contained 1,549 tons of actual potash, K_2O.

Dust from blast furnaces: Potash is recovered from the volatile gases of the pig-iron blast furnace.

Kelp: The kelp is (1) dried, ground and sold as powder; (2) it is heated to low red heat to drive off much of organic matter and sold as such or the potash salts are extracted and recovered by crystallization; (3) it is fermented to produce acetic acid with potash salts as a by-product.

Molasses distillery and beet sugar wastes: The potash remains in the residues in the still after the alcohol has been distilled over. It is recovered by evaporation and crystallization.

Wood ashes: At one time this was the only commercial source of potash salts. The product is a by-product of lumber mills or wood-working establishments using hardwood. The sawdust and scrap is burned as fuel and the ashes sold as such for fertilizer or mixed with lime, leached with water and evaporated. The resulting product is a mixed carbonate and hydroxide known as potash.

The only domestic sources of importance at the present time are the natural potash-borax brines in Searles Lake, Calif., and the distillery waste from alcohol manufacture, although some potash from the flue dusts of blast furnaces and from Steffen's water was sold in 1928, and the developments in the Texas-New Mexico area are assuming importance. The bulk of the production is high-grade muriate (KCl), which finds ready acceptance both in the fertilizer industry, for the manufacture of high-analysis fertilizers, and in the chemical industries. A mutual interdependence prevails between major and minor products which operates to restrict production, so that expansion doubtless will continue to depend on the expansion of the market for the associated products.

American potash production in the year 1929 was maintained on the higher level established in 1928, when substantial gains were made in total output, namely from 77,000 tons of potash salts in 1927 to 104,000 tons in 1928.

Potash Alum. See Aluminum-potassium sulfate.

Potash, Caustic. See Potassium hydroxide.

Potash-magnesia Double Salt (Manure salt; Double manure salts). A potash salt containing not less than 25% of potash (K_2O), nor less than 25% of sulfate of magnesia and not more than 2.5% of chlorine.

Railroad shipping regulations: None.*

Potassa. See Potassium hydroxide.

Potassium (Kalium) K.

Color and properties: Soft, wax-like, silvery metal; rapidly oxidizing in moist air; must be kept submerged in kerosene, ether or the like.

Constants: Sp.gr. 0.8621; m.p. 63.5°C.; b.p. 757.5°C.

Soluble in alcohol, mercury and acids; insoluble in ether and kerosene; decomposes water into its constituents hydrogen and oxygen, generating sufficient heat to ignite the hydrogen.

Derivation: (a) By heating with potassium carbonate, wood charcoal and gypsum. (b) By electrolysis of potassium chloride or a mixture of potassium hydroxide and sulfide, using a cathode of molten lead.

Method of purification: Distillation and squeezing through a fine-meshed cloth.

Grades: Technical.

Containers: Glass bottles.

Uses: In chemical laboratories only, for experimental work, effecting condensations, etc.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Potassium Acetate (Diuretic salts) $KC_2H_3O_2$.

Color and properties: White, crystalline hygroscopic powder; saline taste. Keep well stoppered.

Constants: M.p. 292°C.

Soluble in water and in alcohol; insoluble in ether.

Derivation: By the action of acetic acid on potassium carbonate.

Impurities: Chlorides; sulfates; heavy metals.

Grades: Pure; pure fused; C.P.; U.S.P.; reagent.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs.

Uses: Dehydrating agent; reagent in analytical chemistry; medicine (treatment of rheumatic fever); acetone; cacodylates; cacodylic derivatives; crystal glass.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Railroad shipping regulations: None.*

Potassium Acid Carbonate. See Potassium bicarbonate.

Potassium Acid Oxalate. See Potassium binoxalate.

Potassium Acid Sulfate. See Potassium bisulfate.

Potassium Acid Sulfite. See Potassium bisulfite.

Potassium Acid Tartrate. See Potassium bitartrate.

Potassium-aluminum Sulfate. See Aluminum-potassium sulfate.

Potassium-ammonium Nitrate BASF. A proprietary brand of fertilizer prepared from German synthetic ammonia. It is said to consist of a mixture of potassium and ammonium nitrates, the color varying between gray or light to dark brown, and containing 16% nitrogen and 28% potash. Half of the nitrogen is in the quick-working nitrate form and the other half in the ammonia form. It maintains a good physical condition for a long time if stored in a dry place.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Potassium-antimony Tartrate. See Antimony-potassium tartrate.

Potassium Aurichloride. See Gold-potassium chloride.

Potassium Bicarbonate (Potassium acid carbonate; known as baking soda in some countries) $KHCO_3$.

Color and properties: Colorless, odorless, transparent crystals or white powder; slightly alkaline, salty taste.

Constants: Sp.gr. 2.17; m.p.: Decomposes between 100° and 120°C.

Soluble in water and potassium carbonate solution; insoluble in alcohol.

Derivation: By passing carbon dioxide into a solution of potassium carbonate in water.

Grades: Commercial; highest purity; C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 25 lb. kegs; 112 lb. cases; 100 lb. kegs; 220 lb. barrels; 700, 784 lb. casks.

Uses: In baking instead of yeast or baking powder; medicine; manufacture of pure potassium carbonate.

Railroad shipping regulations: None.*

Potassium Bichromate (Potassium dichromate; Red potassium chromate) $K_2Cr_2O_7$.

Color and properties: Bright, yellowish-red, transparent crystals; bitter, metallic taste; poisonous!

Constants: Sp.gr. 2.692; m.p. 396°C.; b.p.: Decomposes at 500°C.

Soluble in water; insoluble in alcohol.

Derivation: (a) By adding sulfuric acid to crude potassium chromate solution. (b) By heating an aqueous solution of sodium bichromate with potassium chloride, concentrating the solution, whereupon sodium chloride is deposited in the vessel. Lead rods are suspended in the solution and the bichromate crystallizes on these.

Method of purification: Recrystallization.

Grades: Commercial; highest purity; highest purity fused; reagent.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300, 600 lb. barrels; 700, 800 lb. casks.

Uses: Oxidizing agent (chemicals, dyes, intermediates); analytical reagent; brass pickling compositions; electroplating; pyrotechnics; explosives; safety matches; textiles, dyeing and printing; glass; chrome glues and adhesives; milk and milk products preservative; chrome tanning leather; wood stains; histology; poison fly paper; process engraving and lithography; bleaching tallow, palm oil, etc.; photography; pharmaceutical preparations; synthetic perfumes.

Railroad shipping regulations: None.*

Potassium Bimagnesium Sulfate. See Breecht's double salt.

Potassium Binoxalate (Potassium acid oxalate; Acid potassium oxalate; Sal acetosella; Salt of sorrel; Essential salt of lemon; Sorrel salt) $KHC_2O_4 \cdot \frac{1}{2}H_2O$.

Color and properties: White crystals; bitter, sharp taste; somewhat hygroscopic; poisonous!

Constants: Sp.gr. of the anhydrous salt 2.088; m.p.: Decomposes when heated.

Soluble in water.

Derivation: The neutral potassium oxalate and oxalic acid are dissolved in water and crystallized.

Method of purification: Recrystallization.

Grades: Technical; C.P.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300, 700 lb. barrels.

Uses: Removing ink stains; scouring metals; cleaning wood; photography; bleaching straw.

Railroad shipping regulations: None.*

Potassium Biphosphate. See Potassium phosphate, monobasic.

Potassium Bisulfate (Acid potassium sulfate) $KHSO_4$.

Color and properties: Colorless crystals; the fused salt is deliquescent.

Constants: Sp.gr. 2.245; m.p. 200°C.; b.p.: Decomposes.

Soluble in water, yielding a solution with acid reaction; decomposes in alcohol.

Derivation: (a) By heating potassium sulfate with sulfuric acid; (b) By heating potassium chloride with sulfuric acid to a moderate heat.

Method of purification: Crystallization.

Impurities: Heavy metals; chlorine; arsenic.

Grades: Commercial; reagent; fused; highest purity, medicinal.

Containers: Glass bottles; barrels.

Uses: Conversion of tartrate of lime, wine lees and tartrates into potassium bitartrate; food preservative; flux; manufacture of mixed fertilizers by double decomposition with tricalcium phosphate; anisole; methyl acetate; ethyl acetate.

Railroad shipping regulations: None.*

Potassium Bisulfite (Potassium acid sulfite) $KHSO_3$.

Color and properties: White, crystalline powder; sulfur dioxide odor.

Constants: M.p.: Decomposes when heated.

Soluble in water; insoluble in alcohol.

Derivation: Sulfur dioxide is passed through a solution of potassium carbonate until no more carbon dioxide is given off; the solution is concentrated and allowed to crystallize.

Method of purification: Recrystallization.

Impurities: Heavy metals; arsenic.

Grades: Commercial; reagent; highest purity; medicinal.

Containers: Wooden barrels.

Uses: Chemical (reduction of various organic compounds, purification of aldehydes and ketones, manufacture of oxymethylenesulfonic acid, iodine, sodium hydrosulfite); antiseptic; source of sulfurous acid, particularly in brewing; analytical chemistry; tanning; bleaching straw and textile fibers.

Railroad shipping regulations: None.*

Potassium Bitartrate (Cream of tartar; Potassium acid tartrate) $KHC_4H_4O_6$.

Color and properties: White crystals.

Constants: Sp.gr. 1.956.

Soluble in water; slightly soluble in alcohol.

Derivation: From argols by extraction with water and crystallization.

Method of purification: Recrystallization.

Grades: Technical; C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 25, 50 lb. kegs.

Uses: Baking powder; preparation of other tar-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

trates; medicine (diuretic and cathartic); galvanic tinning of metals.
Railroad shipping regulations: None.*

Potassium Bromate $KBrO_3$
Color and properties: White crystals or crystalline powder.
Constants: Sp.gr. 3.27; m.p. 434°C.; b.p.: Decomposes when heated above the melting-point.
Soluble in water; insoluble in alcohol.
Derivation: (a) By adding potassium sulfate to a solution of barium bromate; (b) By passing bromine into a solution of potassium hydroxide, potassium bromide and bromate being formed, which are separated by crystallization.
Method of purification: Recrystallization.
Impurities: Potassium bromide.
Grades: Pure; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25, 100 lb. cases.
Uses: Reagent in analytical chemistry.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Potassium Bromide KBr.
Color and properties: White, crystalline granules or powder; pungent, strong, bitter saline taste; somewhat hygroscopic.
Constants: Sp.gr. 2.749; m.p. 730°C.; b.p. 1435°C.
Soluble in water; slightly soluble in alcohol and ether.
Derivation: (a) Potassium hydroxide in hot solution is treated with bromine, the solution evaporated to dryness, the residue mixed with carbon and heated to redness; (b) Solutions of iron bromide and potassium carbonate are mixed and heated, the solution filtered and concentrated and the bromide crystallized out.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 112 lb. kegs; 100, 112, 220 lb. cases; 300, 450 lb. barrels.
Uses: Medicine (to check convulsions, alleviate pain, promote sleep and allay nervous excitation); photography (gelatin bromide papers and plates); process engraving and lithography; special soaps.
Railroad shipping regulations: None.*

Potassium Carbazolate.
Color and properties: Grayish-white.
Constants: Hydrolyzes readily, with water, forming potassium hydroxide and carbazole.
Derivation: Carbazole plus potassium hydroxide fused together at a temperature of 250°C.
Grades: Technical.
Containers: Iron.
Uses: Intermediate used in manufacture of ethyl carbazole.
Railroad shipping regulations: None.*

Potassium Carbonate (Potash; Pearlash; American ashes; Salts of tartar) (a) K_2CO_3; (b) $2K_2CO_3.H_2O$; (c) $K_2CO_3.H_2O$.
Color and properties: White, deliquescent, granular powder; alkaline reaction.
Constants: (a) Sp.gr. 2.3312; m.p. 909°C.; b.p.: Volatile at white heat.
Soluble in water; insoluble in alcohol.
Derivation: (1) From Stassfurt potassium beds by saturating solution of magnesium and potassium chlorides with carbon dioxide, heating under pressure and evaporating the solution. (2) Lixiviation of wood and plant ashes with water, concentration of the solution and calcination of residue, which is extracted with water; (3) Aqueous residue of beet-sugar molasses after fermentation and distillation to remove alcohol is concentrated and treated as above; (4) Electrolysis of potassium chloride; (5) Recovered from wool washing; (6) Recovered in an impure form, by electrical precipitation from the fumes of cement factories, metallurgical furnaces, etc.
Impurities: Sodium carbonate; potassium chloride; potassium sulfate.
Grades: Crystals; pure; reagent; highest purity; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 100, 200 lb. cases; 400 lb. barrels; 600, 800, 900, 1,100, 1,500 lb. casks.
Uses: Chemical (dehydrating agent, potassium salts, potassium cyanide from potassium ferrocyanide, oxalic acid from sawdust, chromates, chlorates); brewing; ceramics; explosives; fertilizers; mineral waters; Bohemian glass, difficultly fusible glasses; tanning; electroplating; shampoo preparations; pharmaceutical preparations; process engraving and lithography; soft soaps; textiles (dyeing, bleaching, wool washing).
Railroad shipping regulations: None.*

Potassium Chlorate (Potassium oxymuriate) $KClO_3$.
Color and properties: Transparent, colorless crystals or white powder; cooling, saline taste; poisonous!; must not be ground with sugar, sulfur or other combustible substance as may cause explosions.
Constants: Sp.gr. 2.337; m.p. 357°C.; b.p.: Decomposes at about 400°C., giving off oxygen.
Soluble in water and alkalis; very slightly soluble in alcohol.
Derivation: (a) By electrolyzing a hot concentrated alkaline solution of potassium chloride. (b) By interaction of solutions of potassium chloride and sodium chlorate or calcium chlorate.
Method of purification: Recrystallization.
Grades: Highest purity; pure granulated; C.P.; U.S.P.; commercial.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 112 lb. kegs; 220, 550 lb. barrels.
Uses: Oxidizing agent; explosives; matches; source of oxygen; printing textile fabrics; pyrotechnics; percussion caps; medicine; dyes; paper manufacture; disinfectant.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Potassium Chloride KCl.
Color and properties: Colorless or white crystals or powder; strong saline taste. Occurs in nature in the Stassfurt deposits in various minerals.
Constants: Sp.gr. 1.987; m.p. 772°C.; b.p. 1500°C.
Soluble in water and alkalis; slightly soluble in alcohol; insoluble in absolute alcohol.
Derivation: By fusion or extraction of carnallite, $MgCl_2.KCl_6.H_2O$, with a solution of magnesium choride.
Method of purification: Recrystallization.
Impurities: Heavy metals; alkaline earths.
Grades: Highest purity; reagent; commercial; crude; N.F.
Containers: 1, 5 lb. bottles; 5, 25, 50 lb. boxes; 100 lb. kegs; 200 lb. bags; 325, 400 lb. barrels.
Uses: Fertilizer; potassium salts; mineral waters; pharmaceutical preparations; photography.
Railroad shipping regulations: None.*

Potassium Chloroplatinate (Platinum-potassium chloride; Potassium platinichloride) K_2PtCl_6.
Color and properties: Small, orange-yellow crystals or powder.
Constants: M.p.: Decomposes when heated.
Insoluble in alcohol; very slightly soluble in water.
Derivation: By adding platinic chloride to a solution of a potassium salt and crystallizing.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Photography.
Railroad shipping regulations: None.*

Potassium Chloroplatinite K_2PtCl_4.
Color and properties: Ruby-red crystals.
Constants: Sp.gr. 3.291.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in water; insoluble in alcohol.
Derivation: By adding potassium carbonate to a solution of chloroplatinous acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Photography.
Railroad shipping regulations: None.*

Potassium Chromate K_2CrO_4.
Color and properties: Yellow crystals.
Constants: Sp.gr. 2.7319; m.p. 971°C.
Soluble in water; insoluble in alcohol.
Derivation: (a) Roasting powdered chromite with potash and limestone, treating the cinder with hot potassium sulfate solution, and leaching. (b) By adding potassium carbonate to a solution of potassium bichromate and crystallizing.
Method of purification: Recrystallization.
Impurities: Free alkali; sulfates; aluminum; alkaline earths.
Grades: Highest purity; reagent; commercial; crude.
Containers: 1, 5 lb. bottles; 600 lb. barrels.
Uses: Reagent in analytical chemistry; aniline black; textile mordant; enamels; chromate pigments; inks; medicine; leather finishing.
Railroad shipping regulations: None.*

Potassium Chromate, Red. See Potassium bichromate.

Potassium Citrate $K_3C_6H_5O_7.H_2O$.
Color and properties: Colorless or white crystals or powder; cooling saline taste.
Constants: Sp.gr. 1.98; m.p.: Decomposes when heated to about 230°C.
Soluble in water and glycerol.
Derivation: By the action of critic acid on potassium carbonate.
Method of purification: Crystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs.
Uses: Medicine (expectorant).
Railroad shipping regulations: None.*

Potassium Cobaltinitrite. See Cobalt-potassium nitrite.

Potassium Cyanaurate. See Gold-potassium cyanide.

Potassium Cyanide KCN.
Color and properties: White, amorphous, deliquescent lumps or crystalline mass; faint odor of bitter almonds; extremely poisonous, do not handle with bare hands!
Constants: Sp.gr. 1.52; m.p.: At red-heat; b.p.: At red-heat.
Soluble in water, alcohol and glycerol.
Derivation: (a) Potassium carbonate and carbon are heated in a current of ammonia. The fused mass is extracted with alcohol, the latter distilled off and the cyanide fused. (b) Calcium cyanamide is prepared from calcium carbide and nitrogen and is fused with caustic potash. (c) From by-products of beet-sugar manufacture.
Grades: Commercial; pure; C.P.; U.S.P.
Containers: Barrels; glass bottles.
Uses: Extraction of gold and silver from ores; electroplating; heat treatment of steel; reagent in analytical chemistry; insecticide; fumigant; reagent in manufacture of various intermediate organic cyanogen derivatives; paper manufacture; pharmaceutical preparations; fixative in photography; process engraving and lithography; fumigant for raw cotton; fumigant for grain elevators; fumigant for citrus fruits.
Railroad shipping regulations: Class B poison.

Potassium Dichromate. See Potassium bichromate.

Potassium Diïodo-para-phenolsulfonate. See Potassium sozoiodolate.

Potassium Diphosphate. See Potassium phosphate, monobasic.

Potassium Ferricyanide (Red prussiate of potash; Red potassium prussiate) $K_3Fe(CN)_6$.
Color and properties: Bright red, lustrous crystals or powder; poisonous!
Constants: Sp.gr. 1.8109; m.p.: Decomposes when heated.
Soluble in water; slightly soluble in alcohol.
Derivation: Chlorine is passed into a solution of potassium ferrocyanide, the ferricyanide separating out.
Method of purification: Recrystallization.
Impurities: Ferrous salts; potassium chloride.
Grades: Pure crystals; pure powder; commercial; crude; highest purity reagent.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 350, 500 lb. barrels.
Uses: Calico printing; wool dyeing; tempering steel; etching liquid; production of pigments; electroplating; leather; paper manufacture; ingredient of composition used to produce sensitive coatings on blue print paper; fertilizer compositions.
Railroad shipping regulations: None.*

Potassium Ferrocyanide (Yellow prussiate of potash; Yellow potassium prussiate) $K_4Fe(CN)_6.3H_2O$.
Color and properties: Lemon-yellow crystals or powder; mild saline taste; effloresces on exposure to air.
Constants: Sp.gr. 1.853 (17°C.); m.p: Loses its water of crystallization when heated to 60°C.; b.p.: Decomposes when heated to red heat.
Soluble in water; insoluble in alcohol.
Derivation: "Spent oxide" from illuminating gas manufacture is extracted with water to remove ammonia and soluble salts, the residue is dried and sulfur extracted with carbon bisulfide, what remains is mixed with lime, heated with steam in closed pans to recover ammonia, yielding a concentrated solution of calcium ferrocyanide. This is treated with a boiling solution of potassium chloride yielding the calcium-potassium ferrocyanide which is almost insoluble. This is treated with a solution of potassium carbonate, insoluble calcium carbonate being precipitated and a solution of the ferrocyanide remaining, which is filtered, concentrated and crystallized.
Method of purification: Recrystallization.
Impurities: Potassium carbonate, sulfate and chloride; calcium salts.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 350 lb. barrels; 500 lb. casks.
Uses: Medicine; potassium cyanide and ferricyanide; pigments; reagent in analytical chemistry; tempering steel; dyeing; explosives; process engraving and lithography.
Railroad shipping regulations: None.*

Potassium Fluoride (a) KF; (b) $KF.2H_2O$.
Color and properties: White, crystalline, deliquescent powder; sharp saline taste.
Constants: Sp.gr.: (a) 2.454. M.p.: (a) About 800°C.; (b) 41°C.
Soluble in water and hydrofluoric acid; insoluble in alcohol.
Derivation: By saturation of hydrofluoric acid with potassium carbonate.
Method of purification: Crystallization.
Impurities: Arsenic.
Grades: Technical; pure; purified, free of arsenic; C.P.
Containers: 1, 5 lb. waxed bottles; wooden kegs; tins.
Uses: Etching glass; food preservative.
Railroad shipping regulations: None.*

Potassium Glycerinophosphate. See Potassium glycerophosphate.

Potassium Glycerophosphate (Potassium glycerinophosphate) $C_3H_7O_3PO(OK)_2.(H_2O)n$.
Color and properties: Pale yellow, syrupy liquid; acid taste.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in alcohol; miscible with water in all proportions.

Derivation: Glycerol and phosphorus pentoxide or meta-phosphoric acid are mixed, warmed and exactly neutralized with potassium carbonate, warmed and concentrated.

Grades: Technical.

Containers: 5, 10 lb. bottles; 5, 25 lb. cans; 70 lb. carboys.

Uses: Medicine.

Railroad shipping regulations: None.*

Potassium Guaiacol Sulfonate (Orthocoll; Thiocol) $C_6H_3OCH_3OHSO_3K$.

Color and properties: Fine white powder, bitter taste afterwards becoming sweetish, odorless. Contains approx. 60% guaiacol. Nonirritant.

Soluble in water, sparingly in alcohol.

Uses: Medicine (internal antiseptic, tuberculosis, chronic bronchitis, intestinal catarrh, unofficial).

Railroad shipping regulations: None.*

Potassium Hydrate. See Potassium hydroxide.

Potassium Hydrogen Phosphate. See Potassium phosphate, dibasic.

Potassium Hydrogen Phthalate $KHC_8H_4O_4$.

Color and properties: Colorless crystals.

Constants: Sp.gr. 1.636.

Soluble in water.

Derivation: Potassium hydroxide and phthalic anhydride.

Method of purification: Recrystallization.

Grades: C.P.; analytical.

Containers: Glass bottles.

Uses: Alkalimetric standard.

Railroad shipping regulations: None.*

Potassium Hydroxide (Caustic potash; Potassium hydrate; Potassa; Ley; Lye) KOH.

Color and properties: White, deliquescent pieces, lumps or sticks having a crystalline fracture. Keep well stoppered; absorbs water and carbon dioxide from the air.

Constants: Sp.gr. 2.044; m.p. 360.4°C.; b.p.: Sublimes when heated above melting point.

Soluble in water, alcohol; slightly soluble in ether.

Derivation: (a) Electrolysis of concentrated potassium chloride solution. (b) Boiling potassium carbonate with milk of lime.

Method of purification: Sulfur compounds are removed by the addition of potassium nitrate to the fused caustic. The purest form is obtained by solution in alcohol, filtration and evaporation.

Impurities: Alumina; silica; sulfuric acid.

Grades: Commercial; ground; flake; fused (88 to 92%); purified by alcohol (sticks, lumps and drops); reagent, highest purity; U.S.P.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300 lb. barrels; 700 lb. casks; 100, 225, 275, 700-730 lb. drums.

Uses: Soap manufacture; bleaching; manufacture of oxalic acid; manufacture of potassium compounds; reagent in analytical chemistry; medicine (caustic); matches; process engraving and lithography.

Railroad shipping regulations: Solution requires white label.

Potassium Hypophosphite KH_2PO_2.

Color and properties: White opaque crystals or powder with pungent saline taste, very deliquescent. Explosive if ground with nitrates, chlorates or other oxidizing agents.

Soluble in water and alcohol.

Derivation: Interaction of calcium hypophosphite and potassium carbonate.

Grades: U.S.P.; N.F.

Containers: 1. 5 lb. bottles; 5, 10, 25, 50 lb. cans.

Uses: Medicine.

Fire hazard: Dangerous (?)*

Railroad shipping regulations: None(?)*

Potassium Iodide (Lugol solution) KI.

Color and properties: White crystals, granules or powder; strong bitter saline taste.

Constants: Sp.gr. 3.123; m.p. 680°C.; b.p. 1,420°C.

Soluble in water, alcohol, glycerol.

Derivation: A hot solution of potassium hydroxide is treated with iodine, evaporated to dryness, mixed with carbon and heated to redness.

Method of purification: Recrystallization.

Impurities: Potassium carbonate; metals; sulfuric acid; potassium bromide; potassium chloride.

Grades: Crystals; granulated; powder; highest purity; reagent; U.S.P.

Containers: 1, 5 lb. bottles; 25 lb. papers; 1, 5, 25, 100 lb. boxes; 112 lb. cases; 100 lb. kegs; 350 lb. barrels.

Uses: Medicine; reagent in analytical chemistry; photography (precipitating silver).

Railroad shipping regulations: None.*

Potassium Meta-bisulfite (Potassium pyrosulfite) $K_2S_2O_5$.

Color and properties: White, crystalline crusts.

Slightly soluble in water.

Derivation: By heating potassium bisulfite until it loses water.

Grades: Technical; C.P.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300, 500 lb. barrels.

Uses: Antiseptic; reagent in analytical chemistry; source of sulfurous acid; brewing (antiseptic and preservative, cleaning and sweetening casks and vats); food preservative; developing agent for photographic and motion picture films; process engraving and lithography; dyeing.

Railroad shipping regulations: None.*

Potassium Monophosphate. See Potassium phosphate, dibasic.

Potassium Nitrate (Niter; Nitre; Saltpeter) KNO_3.

Color and properties: Transparent, colorless or white crystalline powder or crystals; cooling, pungent, saline taste.

Constants: Sp.gr. 2.1062; m.p. 337°C.; b.p.: Decomposes with deflagration at about 400°C.

Soluble in water; slightly soluble in alcohol.

Derivation: Interaction of a solution of sodium nitrate and potassium chloride.

Grades: Commercial; pure, double refined (granulated, small crystals, medium crystals, large crystals, extra large crystals, powdered); pure, triple refined (granulated, powdered); C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 200 lb. bags; 100, 112 lb. kegs; 350, 400, 500 lb. barrels.

Uses: Pyrotechnics; explosives; matches; pickling meat; fertilizer; reagent in analytic chemistry; tobacco; glass manufacture; metallurgy; candle manufacture.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Potassium Nitrate, German Synthetic, KNO_3.

Color and properties: White, finely crystalline salt containing 13% nitrogen and 44% potash. Less hygroscopic than nitrate of soda.

Soluble in water.

Derivation: Treatment of water and potassium salt with nitric acid, the latter derived by direct synthesis from air.

Grade: Fertilizer, 95% pure.

Containers: Double burlap sacks.

Uses: As a preservative; fertilizer.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Potassium Ortho-phosphate. See Potassium phosphate, dibasic.

Potassium Oxalate $K_2C_2O_4.H_2O$.

Color and properties: Colorless transparent crystals.

Constants: Sp.gr. 2.08; m.p.: Decomposes when heated.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in water.
Derivation: Potassium formate or carbonate mixed with a small quantity of oxalate and a slight excess of alkali is heated, the oxalate extracted with water and crystallized.
Method of purification: Recrystallization.
Impurities: Heavy metals; chlorine.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. boxes; 100 lb. kegs; 250, 300 lb. barrels.
Uses: Medicine; reagent in analytical chemistry; source of oxalic acid; bleaching and cleaning straw hats; removing stains from textiles; photography.
Railroad shipping regulations: None.*

Potassium Oxide K_2O.
Color and properties: Gray, crystalline mass.
Constants: Sp.gr. 2.32; m.p.: Red heat.
Soluble in water, alcohol and ether.
Derivation: By heating potassium nitrate and metallic potassium.
Grades: Technical.
Containers: Tins; iron barrels.
Uses: Potassium salts; dehydrating agent.
Railroad shipping regulations: None(?)*

Potassium Oxymuriate. See Potassium chlorate.

Potassium Permanganate $KMnO_4$.
Color and properties: Dark purple crystals having a blue metallic sheen; sweetish, astringent taste.
Constants: Sp.gr. 2.7032; m.p.: Decomposes at 240°C.
Soluble in water, decomposed by alcohol.
Derivation: (a) Potassium hydroxide is dissolved in water, manganese dioxide and potassium chlorate added, the whole boiled, evaporated and the residue fused to a pasty consistency, then extracted with water and chlorine, carbon dioxide or ozone passed in. The permanganate separates and is centrifuged. (b) By the oxidation of the manganate (prepared by the fusion of pyrolusite with caustic potash) in an alkaline electrolytic cell, using a porous diaphragm.
Method of purification: Recrystallization.
Impurities: Sulfuric acid; nitric acid; chloric acid.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 5, 25 lb. cans; 25 lb. boxes; 100 lb. kegs; 50, 75, 135, 500 lb. drums.
Uses: Disinfectant; deodorant; oxidizing agent; reagent in analytical chemistry; wood preservation; coloring wood brown shades; dyes; bleaching textiles; medicine; manufacture of organic chemicals, especially saccharin; absorbent for poison gases in military gas-masks; bleaching and decolorization of etheral oils, waxes and fatty substances; purification of carbon dioxide used in the manufacture of effervescent drinks; tanning; producing gray colors on copper; increasing the whiteness of lithopone; synthetic perfumes; special photographic processes; dyeing (obtaining brown shades); printing textile fabrics; water purification.
Fire hazard: Dangerous.* Explosions are liable to occur when brought in contact with organic or readily oxidizable materials either in solution or in the dry state.
Railroad shipping regulations: Yellow label.

Potassium Peroxide K_2O_2.
Color and properties: Yellow, amorphous mass.
Decomposes in water, evolving oxygen.
Derivation: By the oxidation of potassium oxide (K_2O) in air.
Grades: Technical.
Containers: Tins.
Uses: Oxidizing agent; bleaching agent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Potassium Persulfate (Anthron) $K_2S_2O_8$.
Color and properties. White crystals.
Constants: M.p.: Decomposes below 100°C.
Soluble in water; insoluble in alcohol.
Derivation: By electrolysis of a saturated solution of potassium sulfate.
Grades: Technical; C.P.
Containers: Glass bottles; 25 lb. stone jars.
Uses: Bleaching; oxidizing agent; reducing agent in photography; antiseptic; soap manufacture.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label(?)*

Potassium Phosphate, Dibasic (Potassium hydrogen phosphate; Potassium monophosphate; Dipotassium ortho-phosphate) K_2HPO_4.
Color and properties: Deliquescent white crystals or powder.
Soluble in water and in alcohol.
Derivation: By action of phosphoric acid on potassium carbonate.
Method of purification: Crystallization.
Impurities: Chlorine; potassium sulfate.
Grades: Commercial; pure; highest purity.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Potassium Phosphate, Monobasic (Potassium diphosphate; Potassium biphosphate) KH_2PO_4.
Color and properties: Colorless crystals.
Constants: Sp.gr. 2.338; m.p. 96°C.
Soluble in water; insoluble in alcohol.
Derivation: By the action of ortho-phosphoric acid on potassium carbonate.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Wooden kegs; glass bottles.
Uses: Medicine; baking powders.
Railroad shipping regulations: None.*

Potassium Platinichloride. See Potassium chloroplatinate.

Potassium Prussiate, Red. See Potassium ferricyanide.

Potassium Prussiate, Yellow. See Potassium ferrocyanide.

Potassium Pyrosulfite. See Potassium meta-bisulfite.

Potassium Rhodanide. See Potassium sulfocyanate.

Potassium-sodium Tartrate (Rochelle salt; Seignette salt; Sodium-potassium tartrate) $KNaC_4H_4O_6 . 4H_2O$.
Color and properties: Colorless, transparent crystals or white powder.
Constants: Sp.gr. 1.77; m.p. 70° to 80°C.; b.p.: Loses $4H_2O$ at 215°C.
Soluble in water; insoluble in alcohol.
Derivation: Potassium acid tartrate is dissolved in water, the solution saturated with sodium carbonate, concentrated after purification and crystallized.
Method of purification: Hydrogen sulfide passed in to remove copper and iron, the solution heated with animal charcoal and filtered.
Impurities: Copper; iron.
Grades: Highest purity; reagent; commercial crystals or powder; U.S.P.
Containers: 1, 5 lb. bottles; 5, 25, 50, 100 lb. boxes; 100, 112 lb. kegs; 225, 300 lb. barrels.
Uses: Medicine (mild saline purgative); manufacture of seidlitz powders; baking powders.
Railroad shipping regulations: None.*

Potassium Sozoiodolate (Sozoiodole; Potassium diïodo-para-phenolsulfonate) $C_6H_2I_2OHSO_3K$.
Color and properties: Colorless crystalline powder.
Slightly soluble in water.
Uses: Medicine (in treatment of skin diseases).
Railroad shipping regulations: None.*

Potassium Sulfate (Salt of Lemery) K_2SO_4.
Color and properties: Colorless or white, hard crystals or powder; bitter, saline taste.
Constants: Sp.gr. 2.6633; m.p. 1,072°C.
Soluble in water; insoluble in alcohol.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: (a) By treatment of potassium chloride with sulfuric acid. (b) By fractional crystallization of kainite.
Method of purification: Recrystallization.
Grades: Highest purity medicinal; commercial; crude; C.P.; N.F.
Containers: Crude: 200 lb. bags. Commercial: 5, 25, 50 lb. boxes; 100 lb. kegs; 300, 400 lb. barrels. C.P. and N.F.: 1, 5 lb. bottles; 1, 5 lb. cans; 25, 50 lb. kegs.
Uses: Reagent in analytical chemistry; medicine (mild purgative); fertilizer; alum manufacture; glass manufacture; raw material for potassium carbonate by the Leblanc process.
Railroad shipping regulations: None.*

Potassium Sulfide, Fused or Concentrated (Potassium sulfuret; Hepar sulfuris) K_2S.
Color and properties: Red, crystalline mass, deliquescent in air. Keep well stoppered.
Constants: Sp.gr. 1.805 (20°/4°); m.p. 471°C.
Soluble in water, alcohol and glycerin; insoluble in ether.
Derivation: Potassium sulfate and carbon are heated in a tightly closed crucible to a moderate temperature.
Grades: Technical.
Containers: Cans; glass bottles.
Uses: Reagent in analytical chemistry; depilatory; medicine.
Fire hazard: Dangerous.* (In crystalline form non-hazardous.)
Railroad shipping regulations: Yellow label.

Potassium Sulfite $K_2SO_3.2H_2O$.
Color and properties: White crystals or powder.
Soluble in water; sparingly soluble in alcohol.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles.
Uses: Medicine (laxative, diuretic, unofficial).
Railroad shipping regulations: None.*

Potassium Sulfocyanate (Potassium rhodanide; Potassium thiocyanate; Potassium sulfocyanide) KCNS.
Color and properties: Colorless crystals.
Constants: Sp.gr. 1.906; m.p. 172.3°C.; b.p.: Decomposes at 500°C.
Soluble in water, alcohol and acetone.
Derivation: By heating potassium cyanide with sulfur.
Method of purification: Crystallization.
Impurities: Heavy metals, sulfates.
Grades: Commercial; pure; purified; reagent.
Containers: Glass bottles; 300 lb. barrels.
Uses: In freezing mixtures; manufacture of artificial mustard oil; reagent in analytical chemistry; manufacture of sulfocyanides; thioureas; in admixture with allyl bromide for making allyl mustard oil; pharmaceutical products from hexamethylene tetramine; printing and dyeing textiles.
Railroad shipping regulations: None.*

Potassium Sulfocyanide. See Potassium sulfocyanate.

Potassium, Sulfurated (Liver of sulfur).
Color and properties: A hard brittle liver-brown substance with nauseous alkaline taste.
Soluble in water with odor of hydrogen sulfide.
Derivation: This is a mixture of potassium polysulfides and thiosulfate obtained by heating potassium carbonate with sulfur.
Grades: Fused granular; U.S.P.
Containers: 1, 5 lb. cans.
Uses: Medicine (treatment of skin diseases).

Potassium Sulfuret. See Potassium sulfide.

Potassium Thiocyanate. See Potassium sulfocyanate.

Potassium-titanium Oxalate. See Titanium-potassium oxalate.

Potato Flour
Derivation: Flour prepared by drying and milling potatoes.
Grades: Technical.
Containers: Bags; wooden barrels.
Uses: Wheat flour substitute; manufacture of potato starch and dextrin.
Railroad shipping regulations: None.*

Potato Oil. See Fusel oil.

Potstone. See Talc.

Potters' Clay. See under Clays, Ball clay.

Poutet's Reagent.
A reagent used for testing oils. It consists of 1 cc. mercury dissolved in 12 cc. nitric acid.

Powder, Black. See Gunpowder.

Powder of Algaroth (Powder of Algarotti). A mixture of antimony oxychloride and antimony oxide, used in preparation of tartar emetic.
Railroad shipping regulations: None.*

Powder of Algarotti. See Powder of Algaroth.

Powellite. $CaMoO_4$ or $Ca(Mo,W)O_4$.
Natural calcium molybdate in which a portion of the molybdenum is replaced by tungsten. Bluish-green crystals contain 1.65 to 10.28% WO_3, Sp.gr. 4.35 to 4.52. Pearly gray scales are more common and contain only traces of tungsten, sp.gr. 4.25.
Occurrence: United States (Idaho, Michigan, Texas, Nevada, California), Siberia.

Power Distillate. A term that has been used in connection with mid-continental petroleum to designate the untreated kerosene condensates and also the heavier distillates down to 28°Be'. Used as fuel for internal combustion engines.
Railroad shipping regulations: None.*

Pozzolana Cement. See under Cements, constructional.

Prague Red.
A fine red pigment consisting, essentially, of red iron oxide. See also: Ferric oxide, red and Hematite, red.

Prase.
A form of native silica or quartz (q.v.). Dull green, translucent.

Praseodymia. See Rare earths.

Praseodymium Pr.
Color and properties: One of the metallic elements of the rare earth group yielding green salts.
Constants: Sp.gr. 6.4754; m.p. 940°C.
Decomposes water.
Derivation: From monazite sand in the form of salts, by extraction with acids.
Grades: Technical.
Containers: Boxes.
Uses: Praseodymium salts.
Railroad shipping regulations: None.*

Precipitated Calcium Phosphate. See Calcium phosphate, tribasic.

Precipitated Chalk. See Calcium carbonate.

Precipitated Oxide of Aluminum. See Aluminum hydroxide.

Precious (Noble) Opal. See Opal.

Prehnite. See Zeolites.

"Preparing Salt." See Sodium stannate.

Pressed Brick Clay. See under Clays.

Pressed Distillate. See Neutral oil.

Priceite. See Colemanite.

Prickly Ash, Bark and Berries. See Xanthoxylum.

Primary Calcium Phosphate. See Calcium phosphate, monobasic.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Prime White Oil.

A kerosene oil, intermediate in color between water white and standard white. See Illuminating oils.

Primrose Chrome. See Chrome yellows.

Primuline. A yellow synthetic dye.

Prince's Metallic Brown. See Prince's mineral brown.

Prince's Mineral Brown (Prince's metallic brown).

A brown pigment made from a natural mineral composed largely of carbonate of iron, silica and alumina; calcination changes the iron carbonate to sesquioxide and eliminates all impurities.

Prince's Pine. See Chimaphila.

Printer's Acetate. See Mordant rouge.

Printer's Iron Liquor. See Iron acetate liquor.

Procaine. See Aminobenzoyldiethylaminoethanol hydrochloride, para-.

Procaine Base. See Aminobenzoyldiethylaminoethane, para-.

Procaine Hydrochloride. See Aminobenzoyldiethylaminoethanol hydrochloride, para-.

Procaine Nitrate. See Aminobenzoyldiethylaminoethanol nitrate, para-.

Prochlorite.

Similar to clinochlore (q.v.) but lower in silicon and mostly with a high percentage of ferrous iron.

Producer Gas.

A gas obtained by burning solid fuel with a restricted supply of air or by passing air and steam through a bed of incandescent fuel under such conditions that any carbon dioxide formed is, as far as possible, converted into carbon monoxide before it leaves the producer, and that the water vapor be split up chemically with the formation of carbon monoxide and hydrogen.

A typical gas will analyze:

	From Coal	From Coke
	Per cent	
Illuminants	0.2	0.0
Carbon monoxide	17.6	25.3
Hydrogen	10.4	13.2
Methane	6.3	0.4
Ethane	0.0	0.0
Carbon dioxide	7.3	5.4
Oxygen	0.7	0.6
Nitrogen	58.1	55.2
B.t.u.	161.	137.

Proflavine (3:6-Diamino acridinium hydrogen sulfate) $C_{13}H_{11}N_3.H_2SO_4$.

Color and properties: Reddish-brown, odorless, crystalline powder.

Soluble in water and alcohol forming brownish solutions which fluoresce green on dilution; nearly insoluble in ether and chloroform.

Derivation: Synthetic.

Method of purification: Crystallization.

Grades: N.N.R.

Containers: Amber glass bottles.

Uses: Antiseptic and bacteriostatic.

Railroad shipping regulations: None.*

Proganol. A silver-albumose compound containing slightly more than 8% colloidal silver. Used in medicine as an antibacterial. Unofficial. See also Silver, colloidal.

Grades: N.N.R.

Railroad shipping regulations: None.*

Propaesin (Propylamine benzoate; Aminobenzoic acid propyl ester, para-) $C_6H_4NH_2COOC_3H_7$.

Color and properties: White crystalline powder.

Constants: M.p. 73°C.

Soluble in alcohol, ether; sparingly soluble in water.

Uses: Medicine (local and internal anesthetic, sore throat, gastric ulcer, quiet vomiting, unofficial).

Railroad shipping regulations: None.*

Propal. See Dipropylbarbituric acid.

Propanenitrile. See Ethyl cyanide.

Propenal. See Acrolein.

Propenyl Alcohol. See Glycerol.

Propenyldichlorhydrin. See Dichlorohydrin, alpha-.

Propione. See Diethylketone.

Propionic Acid (Methylacetic acid; Metactonic acid; Ethylcarbonic acid) $CH_3CH_2CO_2H$.

Color and properties: Clear, colorless liquid.

Constants: Sp.gr. 0.9870; m.p. —19.3°C.; b.p. 140.7°C.

Soluble in water, alcohol and ether.

Derivation: From beet-root molasses by the Effront process and subsequent fractional distillation.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums; carboys.

Uses: Propionates; perfume esters; artificial fruit flavors; anethol.

Railroad shipping regulations: None.*

Propionic Aldehyde. See Propyl aldehyde.

Propionic Ether. See Ethyl propionate.

Propionitrile. See Ethyl cyanide.

Proponal. See Dipropylbarbituric acid.

Propyl Alcohol $CH_3CH_2CH_2OH$.

Color and properties: Colorless liquid; odor similar to ethyl alcohol.

Constants: Sp.gr. 0.808; m.p. —127°C.; b.p. 97°C.

Soluble in water, alcohol and ether.

Derivation: By fractional distillation of fusel oil.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles.

Uses: Organic synthesis; propyl aldehyde.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label(?)*

Propyl Aldehyde (Propionic aldehyde; Propylic aldehyde) CH_3CH_2CHO.

Color and properties: Colorless liquid; suffocating odor.

Constants: Sp.gr. 0.807; b.p. 48°C.

Soluble in water.

Derivation: From propyl alcohol by oxidation.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums.

Uses: Organic synthesis.

Railroad shipping regulations: Red label(?)*

Propylacetic Acid. See Valeric acid, normal.

Propylamine Benzoate. See Propaesin.

Propyldioxybenzenemethylene Ester. See Safrole.

Propylenechlorohydrin, Alpha-. See Chlorohydrin.

Propylenechlorohydrin, Asymmetric. See Chlorohydrin.

Propylene Dichloride (Dichloroisopropane) $CH_2ClCHClCH_3$.

Color and properties: Colorless liquid, chloroform-like odor.

Constants: Sp.gr. 1.166 at 14°C.; b.p. 96.8°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: Action of chlorine on propylene.

Methods of purification: By distillation.

Grades: Refined.

Containers: Glass bottles; steel or galvanized iron drums.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Solvent for oils, fats, waxes, rubber and gum; synthesis; cleaning solution.
Fire hazard: Inflammable(?)*
Railroad shipping regulations: Red label(?)*

Propylene Glycol (Methylethylene glycol) $CH_3CHOHCH_2OH$.
Color and properties: Colorless liquid, slight odor.
Constants: Sp.gr. 1.038 at 23°C.; b.p. 188°C.
Soluble in water, alcohol, ether.
Derivation: (1) Treatment of propylene dichloride with alkali carbonates. (2) Treatment of propylene chlorohydrin with solution of alkalis.
Methods of purification: By distillation.
Grades: Refined.
Containers: Glass bottles; steel drums.
Uses: Organic synthesis; anti-freeze solution.
Railroad shipping regulations: None.*

Propylene Oxide $CH_3(CHCH_2)O$.
Color and properties: Colorless liquid, ethereal odor.
Constants: Sp.gr. 0.859; b.p. 35°C.
Soluble in water, alcohol, ether.
Derivation: (1) Action of alkalis on propylene glycol. (2) Action of alkalis on propylene chlorohydrin.
Methods of purification: By distillation
Grades: Refined.
Containers: Steel cylinders.
Uses: Organic synthesis.
Fire hazard: Inflammable.*
Railroad shipping regulations: Red label.

Propylformic Acid. See Butyric acid.

Propylic Aldehyde. See Propyl aldehyde.

Propyl-meta-cresol, Para-. See Thymol.

Protargentum.
Color and properties: Odorless, chocolate-colored powder, containing approximately 8% colloidal silver. A protein compound of silver.
Soluble slowly in water; insoluble in alcohol.
Grades: N.N.R.
Uses: Medicine (antiseptic for local infections). See also Silver, colloidal.
Railroad shipping regulations: None.*

Protargol.
Color and properties: Yellow powder, a silver-albumin compound containing approximately 8% colloidal silver.
Soluble in water and glycerol.
Grades: N.N.R.
Uses: Medicine (antibacterial, unofficial). See also Silver, colloidal.
Railroad shipping regulations: None.*

Protein.
Color and properties: Yellowish horny mass or powder, being the chief nitrogenous constituent of both animal and vegetable matter, there being over fifty known proteins, which are essentially polypeptides. All are colloids.
Very slightly soluble in water.
Derivation: By enzymatic hydrolysis (digestion) from animal (meat) and vegetable (grain) materials.
Grades: Technical; pure.
Containers: Kegs; tins.
Uses: Nutrient; organic synthesis.
Railroad shipping regulations: None.*

Protocatechol Methylester. See Guaiacol.

Proustite (Light ruby silver ore; Light red silver ore)
Ag_3AsS_3 or $3Ag_2S.As_2S_3$, sometimes some Sb.
Scarlet or vermilion mineral with scarlet to aurora red streak. Adamantine luster. Contains 65.4% silver, 15.2% arsenic, 19.4% sulfur. Usually occurs disseminated through the gangue or as a stain or crust. Blackens when exposed to sunlight. Decomposed by nitric acid with separation of sulfur. Differs from pyrargyrite (q.v.) in scarlet streak and from cuprite (q.v.) and cinnabar (q.v.) by garlic odor when heated.
Constants: Sp.gr. 5.57 to 5.64 (5.57 if pure); hardness 2 to 2.5.
Occurrence: United States (Idaho, Nevada, Colorado, Arizona), Germany, Bohemia, France, Spain, Sardinia, Mexico, Peru, Chile.
Uses: Ore of silver.

Provence Oil.
A very high grade olive oil.

Prune.
Partly dried ripe fruit of Prunus domestica.
Habitat: California, southern France.
Grades: N.F.
Uses: Food; medicine (flavoring agent).

Prunus Virginiana (Choke cherry; Wild cherry).
Derivation: Bark of Prunus serotina.
Habitat: North America.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (flavoring agent for cough syrups).
Railroad shipping regulations: None.*

Prussian Blue. See Iron blues.

Prussian Red.
A fine red pigment consisting, essentially, of red iron oxide. See also Ferric oxide, red and Hematite, red.

Prussiate of Potash, Red. See Potassium ferricyanide.

Prussiate of Potash, Yellow. See Potassium ferrocyanide.

Prussiate of Soda, Red. See Sodium ferricyanide.

Prussiate of Soda, Yellow. See Sodium ferrocyanide.

Prussiate of Sodium, Red. See Sodium ferricyanide.

Prussiate of Sodium, Yellow. See Sodium ferrocyanide.

Prussic Acid. See Hydrocyanic acid.

Pseudobutyl Alcohol. See Butyl alcohol, tertiary.

Pseudocumidine. See Cumidine.

Pseudopropyl Alcohol. See Isopropyl alcohol.

Psilomelane (Black hematite).
Variable and complex mineral. Color, iron-black to dark gray; luster, submetallic or dull; streak, shining brownish black. Contains 70 to 83% MnO_2, 3 to 8% MnO, 3 to 6% H_2O, with partial replacement of manganese by widely varying amounts of BaO (to 16%) and K_2O (to 6%). Various formulas have been ascribed. Is generally mined with pyrolusite (q.v.).
Constants: Sp.gr. 3.7 to 4.7; hardness 5 to 6.
Occurrence: Similar to pyrolusite (q.v.).
Uses: An important ore of manganese.

Psittacinite $4(CuPb)O.V_2O_5.H_2O$.
Unimportant mineral. Found as thin greenish incrustations on quartz.
Occurrence: United States (Montana), Greece.

Psyllium (Fleawort; Fleaseed).
Color and properties: Dark brown, boat-shaped, shiny seeds, containing a mucilaginous compound.
Derivation: Seeds of Plantago psyllium; habitat: Southern Europe.
Grades: Technical.
Containers: Boxes.
Uses: Sizing silk; printing fabrics; paper manufacture; medicine (cathartic).
Railroad shipping regulations: None.*

Ptomaines. Derivatives of ethers of the polyhydric alcohols. All are exceedingly poisonous and are

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

formed in putrefying proteins, dead bodies, decayed meat or fish. They have been prepared synthetically, viz.: Cadaverine is pentamethylenediamine. Muscarine is obtained by the oxidation of lecithin or hydroxethyltrimethylammonium hydroxide. Putrescine is tetramethylenediamine. Neurine is trimethylvinylammonium hydroxide.

Ptyalin. See Enzymes.

Ptychotis Oil. Ajowan oil (q.v.).

Pucherite $BiVO_4$.
Crusts of small reddish-brown, brilliant crystals on ores of bismuth. A yellow pulverulent "bismuth-ochre" occurring with native bismuth in the gem (tourmaline) and lithia mines of California has the same composition.
Constants: Sp.gr. 6.25.
Occurrence: United States (California), Germany.

Pudding Pipe. See Cassia fistula.

Pudding Stick. See Cassia fistula.

Pulegium Oil. Hedeoma oil (q.v.).

Pulegone $C_{10}H_{16}O$.
Derivation: A ketone found in pennyroyal oil.
Constants: Sp.gr. 0.9323 (20°C.); b.p. 221°C.

Pulmoform. See Methylene diguaiacol.

Pulsatilla (Pasque flower; Wind flower; Meadow anemone; Easter flower).
Derivation: Herb of various varieties of pulsatilla.
Habitat: United States; Europe; Asia.
Grades: Technical; N. F.
Containers: Bags.
Uses: Medicine (local irritant, diuretic, diaphoretic, expectorant, sedative).
Railroad shipping regulations: None.*

Pulsatilla Camphor. See Anemonin.

Pumex. See Pumice.

Pumice (Pumex).
Highly vesicular lava, i.e., a rock which has reached the surface of the earth in a molten condition, and varying in composition according to locality of origin. Chiefly complex silicates of aluminum, potassium and sodium.
Occurrence: United States (Colorado, Nebraska, Kansas), Italy, New Zealand.
Grades: Lump; powdered; ground.
Containers: Lump: 250 lb. barrels; bags of various sizes. Powdered: 25 lb. boxes; 110 lb. kegs; 300, 350 lb. barrels.
Uses: Abrasive; base for depositing catalyzers; filling for acid towers; abrasive soaps; tooth powders; cosmetics; paint filler; fireproofing compounds; cements; process engraving and lithographing; metal polishes; printing; insulating compounds; tanning.
Railroad shipping regulations: None.*

Pumpkin Seed. See Pepo.

Purgatin. See Purgatol.

Purgatol (Purgatin). Anthrapurpurin diacetyl ester, a synthetic cathartic used in medicine. Unofficial.
Railroad shipping regulations: None.*

Purgen. See Phenolphthalein.

Purging Cassia. See Cassia fistula.

Purging Croton. See Tiglium.

Purglets. See Phenolphthalein.

Purgolade. See Phenolphthalein.

Purified Ozokerite. See Ceresin.

"Purite." Trade name for a specially prepared fused soda ash furnished in the form of two-pound cast pigs and stated to contain over 98% sodium carbonate.
Containers: 200 lb. bags; 350 lb. barrels; bulk.
Uses: Cupola flux; refining and desulfurizing iron, steel and other metals.

Purple Boneset. See Eupatorium purpureum.

Purple Cone Flower. See Echinacea.

Purple Copper Ore. See Bornite.

Purple Fox-glove. See Digitalis.

Purple of Cassius. See Gold-tin purple.

Purple Oxide. See Ferric oxide, red.

Purpurin Red. See Anthrapurpurin.

Purrea Arabica. See Indian yellow (Purree).

Purree. See Indian yellow (Purree).

Putty. A mixture of whiting (chalk) with 18% of linseed oil, with or without white lead or other pigment.

Putty Oil.
An oil similar to that given under "Concrete form oil" is suitable for this purpose.

Puzzolana Cement. See under Cements, constructional, Pozzolana cement.

Pyramidone (Amidopyrine; Dimethylaminoantipyrine) $C_3ON_3(CH_3)_4C_6H_5$.
Color and properties: Colorless crystalline powder, almost tasteless, odorless.
Constants: M.p. 107° to 109°C.
Moderately soluble in water.
Derivation: By reducing isonitrosoantipyrine with zinc and methylating with methyl iodide.
Grades: U.S.P.
Containers: 1 lb. cartons.
Uses: Medicine (analgesic in migraine, neuralgia, dysmenorrhea, locomotor ataxia, etc.).
Railroad shipping regulations: None.*

Pyramidone Acid Camphorate (Pyramidone bicamphorate) $C_{13}H_{17}N_3OC_{10}H_{16}O_4$.
Color and properties: White crystalline powder; faint acid reaction.
Constants: Fuses between 84° and 94°C.
Soluble in water and alcohol.
Uses: Medicine [similar to pyramidone (q.v.); night sweats of phthisis, unofficial].
Railroad shipping regulations: None.*

Pyramidone Bicamphorate. See Pyramidone acid camphorate.

Pyramidone Neutral Camphorate $(C_{13}H_{17}N_3O)_2C_{10}H_{16}O_4$.
Color and properties: White crystalline powder.
Constants: Fuses between 80° and 90°C.
Soluble in water and alcohol.
Railroad shipping regulations: None.*

Pyranthrene (Indanthrene golden orange).
A valuable orange vat dye derived by heating 2:2′-dimethyl 1:1′-dianthraquinonyl.

Pyrargyrite (Dark ruby-silver ore) Ag_3SbS_3 or $3Ag_2S.Sb_2S_3$, sometimes with some Sb.
Black to grayish-black mineral, light deep red by transmitted light. Purplish-red streak, metallic to adamantine luster. A natural silver sulfantimonite. Contains 59.9% silver, 22.3% antimony, 17.8% sulfur. Distinguished from proustite by color of streak and from cuprite, cinnabar and realgar by color of streak and silver reaction. Soluble in nitric acid.
Constants: Sp.gr. 5.77 to 5.86; hardness 2.5.
Occurrence: United States (Idaho, Nevada, Arizona, Colorado, Utah), Mexico, Chile, Germany, Bohemia, Hungary, Norway, Spain, England, Canada.
Uses: Ore of silver.

Pyrasteel. A ferrous alloy containing 57% iron, 25% nickel, 15% chromium, 0.3% carbon.

Pyrazine. See Antipyrine.

Pyrazine Hexahydride. See Piperazine.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Pyrazoline. See Antipyrine.

"Pyrene." A proprietary name for liquid fire-extinguisher stated to consist of carbon tetrachloride, etc.

Pyrethrum Flowers (Persian insect flowers; Persian pellitory).

Derivation: Flowers of Pyrethrum roseum.

Habitat: Persia and western Asia.

Grades: Technical.

Containers: Bags.

Uses: Insecticide.

Railroad shipping regulations: None.*

Pyrethrum Root (Pellitory; Spanish pellitory; Spanish chamomile; Bertram; Longwort).

Derivation: Root of Anacyclus pyrethrum, D.C.

Habitat: North Africa.

Grades: Technical; U.S.P.

Containers: Bags.

Uses: Medicine (powerful irritant).

Railroad shipping regulations: None.*

Pyridine $CH(CHCH)_2N$.

Color and properties: Slightly yellow or colorless liquid; sharp penetrating empyreumatic odor; burning taste; slightly alkaline in reaction.

Constants: Sp.gr. 0.9746; m.p. —42.0°C.; b.p. 115.5°C.

Soluble in water, alcohol, ether, benzene, benzine, and fatty oils.

Derivation: Distillation of organic compounds containing nitrogen, gas liquor or light coal-tar oil.

Method of purification: Fractional distillation.

Grades: Technical; medicinal; C.P.

Containers: Technical: 55, 110 gal. drums; 50 gal. barrels. Medicinal: 1, 5 lb. bottles; 5, 25 lb. cans. C.P.: 1, 5 lb. bottles.

Uses: Denaturant for alcohol; solvent for anhydrous metallic salts; solvent in rubber, paint and other industries; medicine; textiles (dyeing assistant); incandescent gas mantle manufacture.

Fire hazard: Dangerous.*

Railroad shipping regulations: Red label.

Pyridinecarboxylic Acid, Beta- or Meta-. See Nicotinic acid.

Pyridyl-alpha-normal-methyl-beta-pyrolidine. See Nicotine.

Pyrite (Iron pyrites; Fool's gold) FeS_2, often with small amounts of Cu, As, Ni, Co, Au.

Brass-yellow or brown tarnished mineral, greenish or brownish-black streak, metallic luster. Contains 46.7% iron, 53.3% sulfur. Differs from chalcopyrite (q.v.) and pyrrhotite (q.v.) in hardness, from marcasite (q.v.) in that its powder is completely soluble in strong nitric acid and from gold in color, streak and brittleness. Is very widely distributed, being the most common sulfide mineral.

Constants: Sp.gr. 4.9 to 5.2; hardness 6 to 6.5.

Occurrence: United States (Virginia, New York, Massachusetts, Connecticut, New Jersey, Colorado, Utah), Norway, Germany, France, Italy, Spain, Portugal, England, Hungary, Sweden, Canada.

Uses: Ore of iron; sulfuric acid manufacture; paper manufacture (sulfur dioxide); sulfur manufacture (by distillation); copperas; radio (detectors); cheap jewelry; recovery of gold, silver, copper.

See also Ferrous sulfide.

Pyrite, White. See Marcasite.

Pyrites, Arsenical. See Arsenopyrites.

Pyrites, Capillary. See Millerite.

Pyrites, Cinder.

Color and properties: Dark red lumps. Composed mainly of iron oxide but contains, usually, from 1 to 4% sulfur as sulfate of the metals present.

Derivation: The residue from the burning of pyrites.

Uses: Sometimes sold for the recovery of the iron or copper and silver.

Railroad shipping regulations: None.*

Pyrites, Cobalt. See Linnaeite.

Pyrites, Cockscomb. Groups of marcasite (q.v) crystals.

Pyrites, Copper. See Copper sulfide, also Chalcopyrite.

Pyrites, Hair. See Millerite.

Pyrites, Iron. See Pyrite.

Pyrites, Magnetic. See Pyrrhotite.

Pyrites, Spear. Groups of marcasite (q.v.) crystals.

Pyrites, Tin. See Stannite.

Pyro. See Nitrocellulose.

Pyroacetic Ether. See Acetone.

Pyroantimonite. See Kermesite.

Pyrobitumen.

A dark-colored, solid, infusible, naturally occurring hydrocarbon complex, often associated with a mineral matrix, insoluble in water, and relatively insoluble in carbon bisulfide, benzene, etc.

Pyrocatechin. See Pyrocatechol.

Pyrocatechinic Acid. See Pyrocatechol.

Pyrocatechinmonomethyl Ester. See Guaiacol.

Pyrocatechol (Ortho-dihydroxybenzene; Pyrocatechinic acid; Oxyphenic acid; Catechol) $C_6H_4(OH)_2$.

Color and properties: Colorless crystals.

Constants: Sp.gr. 1.371; m.p. 104°C.; b.p. 245°C.

Soluble in water, alcohol, ether, benzene and chloroform.

Derivation: (a) By fusion of ortho-phenolsulfonic acid with caustic potash. (b) By heating guaiacol with hydriodic acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs; glass bottles.

Uses: Antiseptic; photography.

Railroad shipping regulations: None.*

Pyrocatecholcetodimethylaminaphenyldimethylpyrazolone. See Migrol.

Pyrocellulose. See Nitrocellulose.

Pyrocotton. See Nitrocellulose.

Pyrogallic Acid (Pyrogallol; Trioxybenzene) $C_6H_3(OH)_3$.

Color and properties: White, lustrous crystals.

Constants: Sp.gr. 1.463; m.p. 132.5°C.; b.p. 293°C.

Soluble in water, alcohol and ether.

Derivation: By heating gallic acid with three times its weight of water, in an autoclave.

Grades: Technical; C.P.; U.S.P.

Containers: 1 lb. bottles; 1, 5 lb. cans; wooden barrels; kegs.

Uses: Protective colloid in preparation of metallic colloidal solutions; photography; dyes; intermediates; synthetic drugs; medicine (germicide); process engraving; analytical reagent.

Railroad shipping regulations: None.*

Pyrogallol. See Pyrogallic acid.

Pyroglycerin. Nitroglycerin (q.v.).

Pyrola. See Chimaphila.

Pyroligneous Acid (Wood vinegar; Pyroligneous vinegar) $H_2C_2H_3O_2$.

Color and properties: Yellowish liquid; strong odor of furfural; containing 7% acetic acid.

Constants: Sp.gr. 1.018 to 1.030.

Soluble in water and alcohol.

Derivation: By the destructive distillation of wood.

Method of purification: Rectification.

Impurities: Methyl alcohol; pyridine.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.

Containers: Wooden barrels.

Uses: Lime acetate; methyl alcohol; ferric acetate; dyes; pyrolignite.

Railroad shipping regulations: White label.

Pyroligneous Liquor. See Pyroligneous acid.

Pyroligneous Spirit. See Methyl alcohol.

Pyroligneous Vinegar. See Pyroligneous acid.

Pyrolignite of Iron. See Iron acetate liquor.

Pyrolignite of Lime. See Calcium acetate.

Pyrolusite (Manganese dioxide, black) MnO_2.

Iron-black to dark steel-gray or bluish mineral; streak, black or bluish-black; luster, metallic or dull. Sufficiently soft to soil the fingers. Found with psilomelane (q.v.) and other black manganese oxides. Is thought to be an alteration product of manganite (q.v.) or polianite (q.v.), etc. Contains 63.2% manganese. Soluble in hydrochloric acid.

Constants: Sp.gr. 4.73 to 4.86; hardness 2 to 2.5.

Occurrence: United States (Virginia, Georgia, Arkansas, Lake Superior region, Massachusetts, Vermont, New Mexico), Germany, Bohemia, Transylvania, Australia, India, Canada.

Uses: An important manganese ore. See also manganese dioxide.

Pyromorphite $Pb_5Cl(PO_4)_3$ or $Pb_3(PO_4)_2Pb_2Cl(PO_4)$, often with some As, Fe or Ca.

A natural lead chlorophosphate. Green, gray, brown, yellow, orange or white in color, resinous luster. Contains 82.2% PbO, 15.7% P_2O_5, balance Cl. A decomposition product of galenite (q.v.) and other lead minerals occurring near the outcrop, sometimes in sufficient quantities to be smelted. Pyromorphite and mimetite (q.v.) are similar in appearance and both were formerly included under the old names "green lead ore" and "brown lead ore." Soluble in nitric acid.

Constants: Sp.gr. 5.9 to 7.1; hardness 3.5 to 4.

Occurrence: United States (North Carolina, Maine, Idaho, Arizona, Montana, Colorado, Nevada, Pennsylvania), France, Siberia, England, Scotland, Australia, South Africa.

Pyromucic Aldehyde. See Furfural.

Pyronaphtha.

A mineral burning oil. See Burning oils, mineral.

Pyrope. See Garnet.

Pyrophoric Alloy (Sparking metal; Auermetal).

An alloy of Misch metal (q.v.) with about 30% of other metals, chiefly iron.

Uses: Pyrophoric alloy produces sparks on gentle friction and is used as the tip in various kinds of lighters; e.g., gas lighters, pocket lighters, etc.

Railroad shipping regulations: None.*

Pyrophyllite (Pencil stone; Agalmatolite). Natural hydrous aluminum silicate, $H_2O.Al_2O_3.4SiO_2$, resembles talc in structure, color, luster and feel. It is used for the manufacture of slate pencils and the talc or "talcum" of commerce. Quarried in California and North Carolina.

Pyrorthite. See Allanite.

Pyrosal. See Antipyrine acetyl salicylate.

Pyrostibite. See Kermesite.

Pyrosulfuric Acid. Fuming sulfuric acid (q.v.).

Pyrotartaric Acid (Methylsuccinic acid) COOHCH.

Color and properties: White or yellowish crystals.

Constants: Sp.gr. 1.4105; m.p. 117° to 118°C.

Soluble in water, alcohol and ether.

Derivation: By distilling tartaric acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles; wooden kegs.

Uses: Organic synthesis.

Railroad shipping regulations: None.*

Pyrotartaric Acid, Normal. See Glutaric acid.

Pyrovanadic Acid. See Vanadic acid.

Pyroxylic Spirit. See Methyl alcohol.

Pyroxylin. See Nitrocellulose.

Pyrrhotine. See Pyrrhotite.

Pyrrhotite (Magnetic pyrites; Pyrrhotine; Mundic).

A natural ferrous sulfate, frequently with small percentages of copper, cobalt and nickel. Contains varying amounts of dissolved sulfur. General formula, Fe_nS_{n+1}, composition range, Fe_5S_6 to $Fe_{16}S_{17}$. Usually, Fe_8S_9. Color, bronze-yellow to bronze-red, subject to tarnish. Streak, grayish-black. Luster, metallic. Magnetic, but varying in intensity. Fe_7S_8 contains 60.4% iron, 39.6% sulfur.

Constants: Sp.gr. 4.58 to 4.64; hardness 3.5 to 4.5.

Occurrence: United States (Tennessee, Vermont, Virginia, Pennsylvania, Maine, New York), Canada, Norway, Sweden, Germany, Brazil, England.

Uses: Ore of iron; manufacture of sulfuric acid; sometimes a valuable ore of nickel.

Pyrrole $(CHCH)_2NH$.

Color and properties: Yellowish, liquid oil; burning, pungent taste; readily polymerizes by the action of light and turns brown.

Constants: Sp.gr. 0.9669; b.p. 130° to 131°C.

Soluble in alcohol, ether, and dilute acids; insoluble in water and dilute alkalis.

Derivation: By the fractional distillation of bone-tar or bone-oil with sulfuric acid.

Method of purification: Conversion into the potassium compound (C_4H_4NK), washing with ether and treatment with water, followed by drying and distillation.

Grades: Technical.

Containers: Iron drums.

Uses: Manufacture of drugs.

Railroad shipping regulations: None.*

Pyrrole Tetraiodide. See Iodol.

"Pyxol." A proprietary disinfectant, stated to consist of an emulsion of coal-tar acids with soap.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

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Quaker Buttons. See Nux vomica.

Quartz.
Natural, crystallized silicon dioxide, SiO_2. It is the main constituent of sandstone and one of the three chief constituents of granite and pegmatite. It is very resistant to weathering and when rocks are so disintegrated the quartz is left as quartz-sand. It is also the most frequent of the gangue materials in mineral veins. Varieties of quartz of varying structure and color (usually due to a small amount of an oxide) are agate, aventurine, amethyst, bloodstone, Brazilian pebble, buhrstone, carnelian, cat's eye, chalcedony, chert, cairngorm, chrysoprase, cirtine, flint, hairstone, hornstone, hyalite, jasper, jaspilite, Lydian stone, milk quartz, needlestone, onyx, opal, plasma, prase, rock crystal, rose quartz, sard, smoky quartz, tiger's eye. (See under these various names.) Quartz has also been produced artificially. Sp.gr. 2.65 to 2.66, hardness 7. Insoluble in acids (excepting hydrofluoric) and only slightly attacked by solutions of caustic alkalis.

Quartz Conglomerate. See Quartzose sandstone.

Quartz, Granular. See Quartzite.

Quartz Milk. A milk white, almost opaque variety.

Quartz Rock. See Quartzite.

Quartz, Rose.
Rose or pink colored variety, the tint probably from titanium content. On exposure becomes lighter colored.

Quartz, Smoky. See Cairngorm.

Quartzite (**Granular quartz; Quartz rock**).
A metamorphic product of sandstone, being a rock composed of grains of quartz (q.v.), firmly compacted, with a secondary siliceous cement, the cementing quartz being in crystallographic continuity with the quartz of the grains. Color: grayish or brownish, sometimes snow-white.
Constants: Sp. gr. 2.56 to 2.68.
Uses: Road metal; tube-mill linings; tower packings, etc.

Quartzose Sandstone (Quartz conglomerate).
A rock composed of quartz pebbles and sand, the pebbles sometimes being jasper and chalcedony.

Quassia (Bitter ash; Bitterwood).
Derivation: The wood or bark of Picrasma excelsa or Quassia amara; very bitter taste.
Habitat: Warmer regions of the world.
Chief constituents: Quassin, quassol, picrasmin.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Decoction or tincture as a fly poison; surrogate for hops; medicine (powerful bitter); hair lotion.
Railroad shipping regulations: None.*

Quebracho (Aspidosperma).
The bark of Aspidosperma quebracho-blanco and quebracho-colorado from Argentina.
Chief constituents: Aspidospermine, tannin, quebrachine.
Grades: Technical.
Containers: Bags.
Uses: Quebracho-blanco in medicine (unofficial) for its tannin and alkaloid content; quebracho-colorado in tanning and dyeing for its tannin content.
Railroad shipping regulations: None.*

Quebracho Extract.
Derivation: From the wood of Aspidosperma quebracho and Quebrachu lorentzu, which is imported into the United States in logs.
Grades: Liquid: 35 to 37% tannin. Solid: 65% tannin.
Containers: Extract: 400, 500 lb. wooden barrels; tank-cars. Extract (powdered): 110 lb. bales.
Uses: Tanning industry; dyeing.
Railroad shipping regulations: None.*

Queen of the Meadow. See Eupatorium purpureum.

Queen's Metal.
A jeweler's alloy composed of 9 parts tin and 1 part each of antimony, bismuth, and lead.

Queens' Root. See Stillingia.

Queensland Asthma Weed. See Euphorbia pilulifera.

Quercimetin. See Quercitrin.

Quercite. See Quercitol.

Quercitin (Meletin; Quercetinic acid; Tetrahydroxylflavanol) $C_{15}H_{10}O_7 . 2H_2O$.
Color and properties: Brown, crystalline powder.
Constants: M.p. 313° to 315°C.; b.p.: Decomposes when heated slightly above the melting-point.
Soluble in alkalis; slightly soluble in water.
Derivation: Action of dilute sulfuric acid on quercitrin.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Dyeing.
Railroad shipping regulations: None.*

Quercitinic Acid. See Quercitin.

Quercitol (Acorn sugar; Quercite; Pentahydroxycyclohexane) $C_6H_7(OH)_5$.
Color and properties: Colorless crystals; sweet taste.
Constants: Sp.gr. 1.5845; m.p. 234°C.
Soluble in water; very slightly soluble in alcohol; insoluble in ether.
Derivation: By extraction of acorn meal with water.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Quercitrin (Quercimetin; Quercitrinic acid) $C_{21}H_{22}O_{12} . 2H_2O$.
Color and properties: Yellow glucosidal, crystalline powder.
Constants: M.p.: Decomposes at 168°C.
Soluble in acids, alkalis and amyl alcohol; slightly soluble in alcohol, ether and water.
Derivation: By extraction of the bark of the black oak, Quercus tinctoria.
Grades: Technical
Containers: Wooden kegs.
Uses: Manufacture of quercitin.
Railroad shipping regulations: None.*

Quercitrinic Acid. See Quercitrin.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Quercitron.
Derivation: The powdered bark of Quercus coccinea, var. tinctoria.
Grades: Extract 25% tannin.
Containers: Bark: 100, 150 lb. burlap bags. Extract: Liquid, 450, 500, 600 lb. wooden barrels; powdered, 60, 100 lb. boxes.
Uses: Leather industry; textile industry.
Railroad shipping regulations: None.*

Quercus (White oak bark).
Derivation: The dried bark of the white oak, Quercus alba, containing quercitannic acid, oak-red, resin, pectin, levulin and gallic acid.
Habitat: Widely distributed.
Grades: Technical; U.S.P.; N.F.
Containers: Bags.
Uses: Medicine (astringent).
Railroad shipping regulations: None.*

Quercus Pedunculata.
Derivation: The bark of the British oak, containing large amounts of tannin.
Grades: Technical.
Containers: Bags.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Quick Grass. See Triticum.

Quicklime. See Calcium oxide.

Quicksilver. See Mercury.

Quicksilver, Horn. See Calomel, native.

Quillaia. See Quillaja.

Quillaja (Soap bark; Quillaia; Panama bark; China bark; Murillo bark).
The dried bark of Quillaja saponaria from Bolivia, Peru, Chile, etc.
Chief constituents: Quillajac acid; quillaja sapotoxin and tannin.
Grades: Technical; N.F.
Containers: Whole: Bags and bales of variable size. Cut, crushed: 175, 200 lb. barrels; bags of variable size.
Uses: Medicine (local irritant); manufacture of sapotoxin, saponin and quillajac acid; in the soft-drink and shampoo liquid industries as a foam producer; emulsifiant for oils, balsams and resins.
Railroad shipping regulations: None.*

Quinaldine (Chinaldine; Alpha-methylquinoline) $C_9H_6NCH_3$.
Color and properties: Yellow oily liquid; odor of quinoline; darkens to reddish-brown in air.
Constants: Sp.gr. 1.1013; b.p. 246° to 247°C.
Soluble in alcohol, ether and chloroform; insoluble in water.
Derivation: (a) By the treatment of aniline and paraldehyde with hydrochloric acid and heat. (b) From coal-tar.
Grades: Technical.
Containers: Iron drums.
Uses: Manufacture of quinoline yellow.
Railroad shipping regulations: None.*

Quinalgene. See Ethoxybenzoylaminoquinoline.

Quinaphenine (Chinaphenine; Quinine carbophenetidide; Phenetidine quinine carbonate) $CO(NHC_6H_4OC_2H_5)(C_{20}H_{23}N_2O_2)$.
Color and properties: White powder, tasteless.
Soluble in alcohol, ether, chloroform, benzene; slightly soluble in water.
Uses: Medicine (antipyretic, analgesic in neuralgias, whooping cough, unofficial).
Railroad shipping regulations: None.*

Quinaphthol (Chinaphthol) $C_{20}H_{24}N_2O_2.(OHC_{10}H_6.SO_3H)_2$.
Color and properties: Yellow, crystalline powder; containing 42% of quinine; bitter taste.
Constants: M.p. 185° to 186°C.
Moderately soluble in alcohol and hot water; insoluble in cold water.
Derivation: By the interaction of quinine and beta-naphtholsulfonic acid.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (antipyretic, intestinal antiseptic, typhoid fever, acute rheumatism, unofficial).
Railroad shipping regulations: None.*

Quinazarin (Quinizarin; Chinizarin; 1:4-Dihydroxyanthraquinone) $C_{14}H_8O_4$.
Color and properties: Lustrous, orange-red crystals.
Constants: M.p. 194° to 195°C.
Soluble in alcohol and ether.
Derivation: (a) By the action of concentrated sulfuric and boric acids on anthraquinone. (b) By heating hydroquinone and phthalic anhydride for two hours with concentrated sulfuric acid. The solution is poured into water, the precipitate washed with hot water and boiled with glacial acetic acid.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Production of quinazarin green and analogous dyes.
Railroad shipping regulations: None.*

Quince Seed. See Cydonia.

Quince Essence. An alcoholic solution of ethyl pelargonate, used as a flavoring liquid.

Quineonal. See Quinine diethylbarbiturate.

Quinhydrone $C_6H_4O_2C_6H_4(OH)_2$.
Color and properties: Dark green crystals.
Constants: M.p. 171°C.
Slightly soluble in water.
Derivation: Oxidation of hydroquinone with sodium dichromate.
Method of purification: Recrystallization.
Grades: C.P.
Containers: Glass bottles.
Uses: Quinhydrone electrode.
Railroad shipping regulations: None.*

Quinic Acid (Chinic acid; Kinic acid) $C_6H_7(OH)_4COOH.H_2O$.
Color and properties: White, transparent crystals; very acid taste.
Constants: Sp.gr. 1.637; m.p. 160°C.; b.p.: Decomposes.
Soluble in water and alcohol; insoluble in ether.
Derivation: From cinchona bark.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Quinidine (Chinidine; Conchinine; Beta-quinine; Cinchotine; Pitayin) $C_{20}H_{24}N_2O_2$.
Color and properties: Colorless, lustrous, crystalline alkaloid; efflorescing on exposure to air.
Constants: M.p. 171.5°C.
Soluble in chloroform, alcohol and ether; very slightly soluble in water.
Derivation: By the extraction of certain species of cinchona bark.
Method of purification: Recrystallization.
Grades: Technical; N.F.
Containers: ⅛, ¼, ½, 1 oz. vials; 1, 5, 25, 50, 100 oz. tins.
Uses: Medicine (as the alkaloid or as the bisulfate, citrate, hydrobromide, sulfate (U.S.P.) or tannate, etc., for treatment of cardiac irregularity).
Railroad shipping regulations: None.*

Quinine $C_{20}H_{24}N_2O_2.3H_2O$.
Color and properties: Bulky, white, amorphous powder or crystalline alkaloid; very bitter taste; odorless and levo-rotatory.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants:	Melting-point
Alkaloid, anhydrous: $C_{20}H_{24}N_2O_2$	174.9°C.
Alkaloid, hydrous: $C_{20}H_{24}N_2O_2.3H_2O$	57.0°C.
Bisulfate: $C_{20}H_{24}N_2O_2.H_2SO_4.7H_2O$	160.0°C. (about)
Hydrobromide: $C_{20}H_{24}N_2O_2.HBr.H_2O$	152° to 200°C.
Hydrochloride: $C_{20}H_{24}N_2O_2.HCl.2H_2O$	156° to 200°C.
Salicylate: $C_{20}H_{24}N_2O_2.C_7H_6O_3.H_2O$	183° to 187°C.

Soluble in alcohol, ether, chloroform, carbon bisulfide, benzine, oils, glycerol, potassium hydroxide solution, ammonium hydroxide and acids (with formation of salts); very slightly soluble in water.

Derivation: Finely ground cinchona bark mixed with lime is extracted with hot high-boiling paraffin oil. The solution is filtered, shaken with dilute sulfuric acid, the latter neutralized hot with sodium carbonate and on cooling quinine sulfate crystallizes out. The sulfate is treated with ammonia, the alkaloid being obtained.

Method of purification: Precipitation as tartrate from its solution by means of Rochelle salt.

Impurities: Other cinchona alkaloids.

Grades: Technical; U.S.P.

Containers: 1/16, 1/12, 1/8, 1/4, 1/2, 1 oz. vials; 1, 5, 25, 50, 100 oz. cans.

Uses: Medicine, as the alkaloid or as the acetate, albuminate, arsenate, benzoate, bisulfate (U.S.P.), dihydrochloride (U.S.P.), camphorate, citrate, gallate, glycerophosphate, lactate, phenolate, hydrobromide (U.S.P.), hydrochloride (U.S.P.), phosphate, salicylate, sulfate (U.S.P.), tannate (U.S.P.), tartrate, etc., most of which are soluble in water.

Railroad shipping regulations: None.*

Quinine, Beta-. See Quinidine.

Quinine-beta-naphthol-alpha-sulfanate. See Quinaphthol.

Quinine Carbophenetidide. See Quinaphenine.

Quinine, Crude. See Quinium.

Quinine Dibromosalicylic Acid. See Bromoquinal.

Quinine Diethylbarbiturate (Quineonal; Chineonal).

Color and properties: Colorless crystals, bitter taste. Represents approximately 63.8% quinine and 36.2% barbital.

Soluble in alcohol; sparingly soluble in water.

Uses: Medicine (whooping cough, nerve sedative, unofficial).

Railroad shipping regulations: None.*

Quinine Diglycollic Sulfate. See Insipin.

Quinine Dihydrochloride $C_{20}H_{24}N_2O_2.2HCl$.

Color and properties: White powder, intensely bitter taste, odorless. Contains 81.63% quinine.

Very soluble in water (1 gm. in 0.6 cc.) and alcohol (1 gm. in 12 cc.); slightly soluble in chloroform and ether.

Derivation: (a) By passing hydrochloric acid gas over dry quinine. (b) Decomposition of quinine bisulfate with barium chloride.

Railroad shipping regulations: None.*

Quinine Ester of Salicylic Acid. See Saloquinine.

Quinine Hydrochloride and Antipyrine. See Sinecain.

Quinine Nucleinate.

Color and properties: Yellowish-white powder, containing 40% quinine.

Soluble in alcohol (50%) and dilute glycerol; slightly soluble in water.

Uses: Medicine (bactericide, unofficial).

Railroad shipping regulations: None.*

Quinine and Urea Chloride. See Quinine-urea hydrochloride.

Quinine-urea Hydrochloride (Urea-quinine; Quinine-urea chloride)
$C_{20}H_{24}N_2O_2HClCO(NH_2)_2.HCl.5H_2O$.

Color and properties: White, granular powder, or colorless, translucent prisms. Bitter taste, odorless. Contains not less than 58% anhydrous quinine.

Soluble in water and strong alcohol.

Derivation: By dissolving quinine hydrochloride in hydrochloric acid, filtering, adding urea, heating and crystallizing.

Purification: Recrystallization.

Grades: U.S.P.

Containers: 1 oz. bottles.

Uses: Medicine (hypodermical treatment of malaria; formerly used as a local anesthetic).

Railroad shipping regulations: None.*

Quininic Acid $CH_3OC_9H_5NCO_2H$.

Color and properties: Yellow prisms.

Constants: M.p.: Decomposes at 280°C.; b.p.: Sublimes in part.

Slightly soluble in alcohol; very slightly soluble in water and ether.

Grades: Technical.

Containers: Glass bottles.

Uses: Organic synthesis.

Railroad shipping regulations: None.*

Quinium (Chinium; Crude quinine).

Derivation: Amorphous, friable mass from fresh cinchona bark, extracted by means of potassium hydroxide and alcohol and containing all the constituents of the bark except the woody fiber.

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Medicine; quinine and its salts.

Railroad shipping regulations: None.*

Quinizarin. See Quinazarin.

Quinoidine (Chinoidine).

Color and properties: Brownish-black lustrous mass; resinous appearance; conchoidal fracture; very bitter taste. It is a mixture of the amorphous alkaloids remaining in the solution from the extraction of cinchona bark, after the crystallizable alkaloids have been removed.

Soluble in dilute acids, alcohol and chloroform.

Constants: M.p.: Softens below 100°C.

Grades: Technical.

Containers: 70, 140 lb. drums.

Uses: Medicine, either as such or as the borate, citrate, hydrochloride, sulfate or tannate.

Railroad shipping regulations: None.*

Quinol. See Hydroquinone.

Quinoline (Chinoline; Leukol; Leucoline)
$(CHCH)_2C_2CHCHNCH$.

Color and properties: A tertiary amine, occurring in coal-tar and obtained from it, but more frequently by synthesis; highly refractive, colorless liquid; darkens with age; absorbs water from the air; peculiar, characteristic odor. Keep well stoppered.

Constants: Sp.gr. 1.0899; m.p. —22.6°C.; b.p. 238°C.

Soluble in water, alcohol, ether and carbon bisulfide.

Derivation: By treatment of aniline and nitrobenzene with glycerol and sulfuric acid and heat.

Method of purification: Rectification.

Grades: Pure, from cinchonine; synthetic.

Containers: Glass bottles.

Uses: Medicine; preserving anatomical specimens; manufacture of quinosol.

Railroad shipping regulations: None.*

Quinoline Bismuth Sulfocyanide. See Crurin.

Quinoline Chlormethylate Iodochloride. See Iodolin.

Quinone (Benzoquinone; Chinone) $CO(CHCH)_2CO$.

Color and properties: Yellow crystals; characteristic, irritating odor.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Sp.gr. 1.307; m.p. 115.7°C.; b.p.: Sublimes; volatile with steam, being in part decomposed.
Soluble in alcohol, ether and alkalis; slightly soluble in hot water.
Derivation: By the oxidation of aniline with chromic acid, extraction with ether and distillation of the latter.
Method of purification: Steam distillation.
Grades: Technical.
Containers: 1 lb. bottles; 25 lb. boxes; 100 lb. barrels.
Uses: Manufacture of dyes and hydroquinone.
Railroad shipping regulations: None.*

Quinosol (Oxyquinoline sulfate, normal; Chinosol) $(C_9H_7ON)_2.H_2SO_4$.
Color and properties: Yellow, crystalline powder, weak saffron odor, burning taste, incompatible with alkalis, iron and mercury compounds. Does not coagulate albumin.
Constants: M.p. 175° to 177.5°C.
Soluble in water; difficultly soluble in alcohol; insoluble in ether.
Uses: Medicine (antiseptic, powerful deodorizer, styptic, vaginitis, rhinitis, catarrhs, intestinal disinfectant, cholera, unofficial).
Railroad shipping regulations: None.*

Quinotropin. See Hexamethylenetetramine quinate.

Quinoxaline. Dye of the quinone imide group.

Quisqueite.
Black, lustrous material composed chiefly of carbon and sulfur. Found in the vanadium ore deposit of Peru.
Constants: Sp.gr. 1.75; hardness 2.5.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

R

R Acid. See 2-Naphthol-3: 6-disulfonic acid.

R Salt. The disodium salt of 2-naphthol-3: 6-disulfonic acid (q.v.).

R G Acid. 1-Naphthol-3: 6-disulfonic acid.

R G Salt. The sodium salt of 1-Naphthol-3: 6-disulfonic acid.
Derivation: (1) By fusing sodium naphthalene 1: 3: 6-trisulfonate with half its weight of caustic soda and half its weight of water. (2) By diazotizing 1-naphthol-3: 6-disulfonic acid and adding to boiling dilute sulfuric acid.
Grades: Technical.
Containers: Paste: 350 lb. barrels. Dry: 275 lb. barrels.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Racemic Acid (Para-tartaric acid; Tartaric acid; Inactive; Uvic acid) $C_2H_4O_2(COOH)_2.H_2O$.
Color and properties: Transparent, colorless crystals.
Constants: Sp.gr. 1.697; m.p. 205° to 206°C.
Soluble in water and alcohol.
Derivation: A by-product of the manufacture of tartaric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; boxes; wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Radium Ra.
Color and properties: An exceedingly rare metal occurring in uranium ores, and never isolated as such, always obtained as the bromide or chloride, admixed with barium salts. All radium salts exhibit the phenomena of "radioactivity," i.e., emitting various penetrating radiations and spontaneously breaking down into a series of decomposition products, of which the first is the radium emanation or niton.
Constants: M.p. 700°C.

Radium Bromide $RaBr_2$.
Color and properties: White crystals, becoming yellow or pink with age; radioactive; powerful corrosive effect on skin and flesh. Do not handle.
Constants: M.p.: Sublimes at 900°C.
Derivation: Carnotite, pitchblend or other uranium ore is roasted with sodium carbonate, washed with water and dilute sulfuric acid to remove uranium; the residue is boiled with sodium hydroxide to remove sulfates, washed with water, then treated with hydrochloric acid, sodium carbonate, water and hydrochloric acid in succession. The solution is treated with sulfuric acid, filtered and the precipitate boiled with sodium carbonate, then treated with hydrochloric acid, hydrogen sulfide, chlorine, ammonium hydroxide and sodium carbonate successively. The solution is now treated with hydrobromic acid to convert into the bromide, evaporated to dryness and purified.
Method of purification: Fractional crystallization.
Impurities: Barium salts.
Grades: Technical; pure. The purity is determined by the strength of the ionizing power of the salt, i.e., the extent to which it causes air to conduct electricity.
Containers: Glass bottles; sealed tubes enclosed in sheet lead.
Uses: Medicine (chiefly in the treatment of cancer); mixed with calcium sulfide to produce luminescent paint; physical research.
Railroad shipping regulations: None.*

Radium Chloride $RaCl_2$.
Color and properties: Yellowish-white crystals, becoming yellow or pink on standing; radioactive; powerful corrosive effect on skin and flesh. Do not handle.
Constants: M.p. 1,650°C.
Soluble in water and alcohol.
Derivation: Carnotite, pitchblend or other uranium ore is roasted with sodium carbonate, washed with water and dilute sulfuric acid to remove uranium; the residue is boiled with sodium hydroxide to remove sulfates, washed with water, then treated with hydrochloric acid, sodium carbonate, water and hydrochloric acid in succession. The solution is treated with sulfuric acid, filtered and the precipitate boiled with sodium carbonate, then treated with hydrochloric acid, hydrogen sulfide, chlorine, ammonium hydroxide and sodium carbonate successively. The solution is now treated with hydrochloric acid to convert into the chloride, evaporated to dryness and purified.
Method of purification: Fractional crystallization.
Impurities: Barium salts.
Grades: Technical; pure. The purity of radium salts is determined by the strength of their ionizing power, i.e., the extent to which they cause air to conduct electricity.
Containers: Glass bottles; sealed tubes enclosed in sheet lead.
Uses: Medicine (chiefly in the treatment of cancer); mixed with calcium sulfide to produce luminescent paint; physical research.
Railroad shipping regulations. None.*

Radium Emanation (Niton). A gas produced by the breaking down of radium salts. It is soluble in water and occurs dissolved in many mineral waters. It is supposed to have therapeutic value. It breaks down itself, into a series of simpler bodies.

Radix Saponaria Alba. See Gypsophila.

"Radumine." A synthetic oxalic acid.

Raffinose (Mellitose; Mellitriose; Gossypose) $C_{18}H_{32}O_{16}.5H_2O$.
Color and properties: White, crystalline powder; sweet taste.
Constants: Sp.gr. 1.465; m.p. (anhydrous) 118° to 119°C.; b.p.: Decomposes at about 130°C.; optical rotation +104.5°.
Soluble in water, very slightly soluble in alcohol.
Derivation: By hydrolysis from cottonseed meal.
Method of purification: Recrystallization.
Grades: Technical; pure.
Containers: Wooden barrels; glass bottles.
Uses: Medicine; manufacture of melibiose; bacteriology.
Railroad shipping regulations. None.*

Ragwort. See Senecio.

Railroad Car Oils. See Axle oils, railroad.

Railroad Powder. See Ditch powder.

Raisin-seed Oil. See Grape-seed oil.

Ramirite. See Cuprodescloizite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Randannite. See Diatomaceous earth.

Rape. See Napus.

Rape Cake. The cakes formed in the press when the seeds are subjected to hydraulic pressure in order to express the rape oil. Used as a fertilizer, particularly effective as a top dressing for wheat and barley. Sometimes used as a wire worm medicine.
Railroad shipping regulations. None.*

Rape Meal. The mealy form assumed by rape seeds after the crushing and heating operations preparatory to the expression of the oil in either the hydraulic presses or the expeller. If the oil cake be ground the product again is in this mealy form. Uses are similar to those of rape cake (q.v.).
Railroad shipping regulations. None.*

Rape Oil. See Rape-seed oil.

Rape Oil, Black Sea. See Ravison oil.

Rape-seed and Flowers. See Napus.

Rape-seed Oil (Colza oil; Rape oil).
Color and properties: Dark brown when crude; pale yellow when refined. A very viscous, liquid oil; unpleasant taste and odor; deposits stearin on standing.
Constants: Sp.gr. 0.9132 to 0.9168; solidifying-point —2° to —10°C.; m.p. 17° to 22°C.; refractive index 1.4720 to 1.4752; saponification value 167 to 179; iodine value 96 to 104; maumene value 50 to 67; Hehner value 95.1; acid value 1.4 to 13.2.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: By the expression of rape-seed, Brassica campestris, followed by treatment of the cake with solvents, and evaporation of the solvent. The oil is frequently oxidized or "blown" to increase its density and viscosity. It is refined by treatment with fuller's earth or sulfuric acid.
Grades: Crude; refined. Sometimes known as "Shirashime" or "water-white." This grade should contain less than 0.5% free fatty acids.
Containers: Tins; iron drums.
Uses: Refined and "blown" rape-seed oil is used as a lubricant; illuminant; manufacture of rubber substitutes; heat treatment of steel. The refined cold-drawn oil is also used for edible purposes.
Railroad shipping regulations. None.*

Rapidase. Proprietary name for an enzyme preparation containing liquefying and proteolytic enzymes.
Color and properties: Liquid of low specific gravity and viscosity. Active in slightly acid, neutral and weakly alkaline solutions; can withstand temperatures from 25° to 75°C.
Derivation: Produced by growing pure cultures of certain microörganisms in sterilized wort.
Uses: Desizing agent.
Railroad shipping regulations: None.*

Rare Earth Metals. See Rare earths.

Rare Earth Minerals. See Rare earths.

Rare Earths.
A series of basic oxides, very similar in physical and chemical properties, which are usually found associated in certain rare minerals of complex composition.
The metals of these oxides comprise the elements, the atomic weights of which lie between those of barium and tantalum. These will be found to include: lanthanum, cerium, praseodymium, neodymium samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, neo-ytterbium, lutecium, celtium, scandium, and yttrium.
These metals are usually divided into three groups as follows:
Cerium group: Cerium, lanthanum, neodymium, praseodymium, samarium.
Terbium group: Terbium, europium, gadolinium.
Yttrium group: Yttrium, ytterbium, dysprosium, holmium, erbium, lutecium, celtium, scandium, thulium.
The terbium group is intermediate between the other two groups.
The oxides are known under the following names: yttria, ceria, lanthana, didymia, erbia, terbia, ytterbia, scandia, thulia, holmia, samaria, neodymia, praseodymia, dysprosia, gadolinia, europia, lutecia.
The principal minerals in which these earths occur are cerite, orthite, monazite, eschenite, gadolinite, yttrialite, xenotime, fergusonite, yttrotantalite, samarskite, polycrase, euxenite, keilhauite, thorianite.
Though not within the atomic range given above, thorium (oxide, thoria) and zirconium (oxide, zirconia) are generally included in the metals of the rare earths.
For additional data see under each specific item; also under the salts of the various metals.

Rattlesnake Root. See Senega.

Ravison Oil (Black Sea rape oil).
Color and properties: Clear, yellow, semi-drying, liquid oil.
Constants: Sp.gr. 0.9183 to 0.9217; m.p. —8°C.; iodine number 105 to 117; saponification number 17.79 to 17.93.
Soluble in ether, carbon bisulfide and petroleum ether.
Derivation: From the seeds of the Black Sea rape, the wild Brassica campestris, by expression or extraction.
Grades: Technical.
Containers: Tins; iron drums.
Uses: Lubrication; fuel.
Railroad shipping regulations: None.

Rayon.
Formerly known as artificial silk. It is really not a substitute for natural silk but is a distinct textile product. In general appearance it resembles natural silk very closely, but actually it has an even higher luster. However, the fiber is more wiry and harsh in nature. Four different kinds of rayon are on the market due to the fact that there are four processes by which it can be made. The basic raw material in all four processes is purified cellulose, the processes varying by the chemical treatments to which the cellulose is subjected in order to arrive at the finished product. These rayons are:

Cellulose Nitrate (Chardonnet silk).

The caustic-boiled and bleached cotton linters are nitrated with a mixture of nitric and sulfuric acids to give cellulose nitrate. This is washed in tubs and in the beater, and then boiled to stabilize it by the removal of sulfates, etc. After centrifuging to remove the excess of moisture, the cellulose nitrate is dissolved in a mixture of ether and alcohol to form the collodion spinning solution. This solution is filtered, de-aerated, and forced through fine capillary glass tubes, located in special spinning chambers, into air which evaporates the solvent, leaving filaments of cellulose nitrate.

A number of these individual filaments are collected on a bobbin and twisted together to form the thread. These threads are wound into skeins, which are treated with a sodium hydrosulfide solution to remove the nitrate groups, leaving a regenerated cellulose yarn. The denitrated yarn is washed, bleached with sodium hypochlorite, soured, washed again, neutralized, soaped or oiled, dried, and inspected. It is then ready for shipment in skein form or for rewinding into any desired form of package.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Viscose.

The purified linters or wood pulp, in the form of sheets about 18 inches square, are saturated with strong caustic soda solution in a suitable tank with arrangements for pressing out the excess alkali solution. These sheets, containing a definite amount of alkaline solution, pass into a shredder, where they are disintegrated into soda-cellulose crumbs. The crumbs are placed in sheet-iron covered cans and aged for a definite length of time under controlled temperature and humidity conditions. After aging they go to the xanthators or churns, where they react with carbon bisulfide to form the desired sodium cellulose xanthate. The xanthate is soluble in alkaline solution to give the viscose spinning solution. The viscose solution is ripened again, with a close control of time and temperature, filtered, and de-aerated, when it is ready for spinning.

The spinning is effected by forcing this viscose solution through another filter, a spinning pump or meter and the spinneret which is immersed in an acid precipitating bath. Spinnerets of small diameter and containing as many fine holes as the number of filaments desired in the yarn are used. The acid bath neutralizes the alkali in the viscose solution and regenerates the cellulose filaments. The filaments from each spinneret are collected on a separate bobbin or in a rapidly rotating spinning pot. Where the filaments are collected on a bobbin they are wound parallel without twisting, but in the pot-spinning process they receive a twist of about 2.5 turns per inch due to the rotation of the pot.

After washing and neutralizing the acid present in the yarn, the bobbin-spun filaments are rewound onto spools for twisting. The twisted yarn, from either the bobbin- or pot-spinning process, is then desulfurized, usually by means of a sodium sulfide solution, bleached, washed, oiled, dried, graded, and rewound into packages or packed for shipment.

Cuprammonium (Glanzstoff or Pauly).

The damp purified linter cellulose is dissolved directly in a solution of copper hydroxide in strong ammonia, without any previous chemical treatment. This specially prepared cellulose solution is filtered and de-aerated, and is then ready for spinning at once without either aging or ripening.

As in the previous processes, this cellulose solution is forced through a spinneret into a suitable coagulating bath. However, in this case the spinneret is larger in diameter, has rather large openings, and the coagulating solution does not completely harden the filaments. As a result the incompletely coagulated filaments may be stretched by a special arrangement of the spinning apparatus so as to give individual filaments finer than those obtainable by any other process in use today. The stretched filaments are finally hardened in a second precipitating bath, and are collected on reels in the form of skeins.

This yarn contains considerable precipitated copper, which is dissolved out of the skeins immediately by means of a dilute sulfuric acid solution. It is then washed, neutralized, bleached, washed again, soaped or oiled, dried, and sorted. It is finally wound onto spools, twisted, and then rewound onto cones or other packages for use.

Cellulose Acetate.

This process resembles that used for the production of nitro silk in that the cellulose is esterified in order to render it soluble in certain volatile organic solvents. This cellulose ester solution is then spun into air, a process called "dryspinning". Here, however, the similarity between the two processes ends and the acetate process offers many advantages over the older nitrate process.

In the acetate process the purified cellulose is esterified by means of acetic anhydride in the presence of sulfuric acid, which has a catalytic action, and acetic acid, which acts as a solvent for the cellulose triacetate formed. When the reaction is complete, water is added to the batch and the triacetate permitted to hydrolyze to about the diacetate. Sodium acetate is added to neutralize the mineral acid present and the cellulose ester precipitated by pouring the solution into a limited volume of water. The ester is washed well with water, the last traces of free acid neutralized by means of soda, washed again, and dried at a low temperature to the desired moisture content.

This dried cellulose acetate is dissolved in a mixture of several organic solvents, of which acetone is generally the principal constituent. This solution is filtered and de-aerated, and is then ready for spinning immediately without any aging, ripening, or other treatment.

The cellulose acetate solution is forced through a final filter, spinning pump, and a spinneret of rather large diameter into a tall, narrow spinning chamber containing warm air, which evaporates the solvents present, leaving behind many individual filaments from each spinneret. These filaments are collected, oiled, and twisted in one operation, so as to give a yarn of 2.5 twists per inch without any further treatment. Fine denier yarns with 5 twists per inch are also manufactured. The spinning solvent is, of course, recovered, as well as the excess acetic acid used in the esterification of the cellulose.

Uses: Underwear, hosiery, ribbons, moire, plush, pile fabrics, shoe coverings, gloves, umbrellas, bed spreads, draperies, trimming, elastic webbing, satin, knitted goods, hair nets, laces, embroidery, lining for hats, coats, etc.

Realgar AsS.

Soft aurora-red mineral becoming orange-yellow on long exposure. Orange-red streak, resinous luster. Contains 70.1% arsenic, 29.9% sulfur. Usually occurs in veins associated with silver and lead ores. Has also been found in volcanic regions as a sublimation product and as a deposit from hot spring waters. Is often associated with orpiment and is frequently noted as a sublimation product from furnaces roasting ores of arsenic. Soluble in nitric acid and potassium hydroxide.

Constants: Sp.gr. 3.4 to 3.6; hardness 1.5 to 2.

Occurrence: United States (Utah, Washington, Wyoming), Hungary, Germany, Macedonia, Switzerland, Persia, China.

Uses: Pyrotechnics (artificial now more used); calico printing; tanning (depilatory); shot manufacture (hardening); pigment.

Red, Aniline. See Fuchsin.

Red Antimony. See Antimony red. For the natural product see Kermesite.

Red Arsenic. See Arsenic disulfide.

Red Bark. See Cinchona bark, succirubra.

Red Brass. A non-ferrous alloy containing 85% copper and 15% zinc. It offers good resistance to dilute solutions of sulfuric acid (used for sludge acid in oil refineries). It is also resistant to acetic acid in the absence of air, to hot or cold sodium hydroxide up to 50% and to sea water and moist sulfurous atmospheres.

Red Cinchona. See Cinchona bark, succirubra.

Red Clover Blossoms. See Trifolium.

Red Couch-grass. See Carex.

Reds. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
H.B., L.F.	A	I a
H.C., L.F.	A	I a
H.D., L.F.	A	I a
H.F., L.F.	A	I a
H.J., L.F.	A	I a
H. No. 1	B	I a
H. No. 4	B	I a
H. No. 4-A., L.F.	B	I a
H. No. 5	B	I a
H. No. 6	B	I a
H. No. 11	B	I a
H. No. 14	B	I a

Railroad shipping regulations: High explosive.

Red Hematite. See Hematite, red.

Red Iron Ore. See Hematite, red.

Red Lead. See Lead oxide, red.

Red Liquor. See Mordant rouge.

Red Mercury Iodide. See Mercuric iodide.

Red Mercury Oxide. See Mercuric oxide.

Red Mercury Sulfuret. See Mercury sulfide, red.

Red Ochre. See Hematite, red.

Red Oil. See Oleic acid.

Red Orpiment. See Arsenic disulfide.

Red Oxide. See Ferric oxide, red.

Red Pepper. See Capsicum.

Red Peruvian Bark. See Cinchona bark, succirubra.

Red Precipitate. See Mercuric oxide, red.

Red Prussiate of Potash. See Potassium ferricyanide.

Red Prussiate of Soda. See Sodium ferricyanide.

Red Puccoon. See Sanguinaria.

Red Root. See Sanguinaria.

Red Rudd.

A variety of red hematite (q.v.) used as a pigment.

Red Santal Wood. See Santalum rubrum.

Red Saunders. See Santalum rubrum.

Red, Stone. See Ferric oxide.

Red Zinc Oxide. See Zincite.

Reddle. See Hematite, red.

"Redmanol." A trade name for an organic phenolic condensation product invented by L. V. Redman and used for production of plastics, artificial amber, electrical insulation, lacquers, etc.

Redruthite. See Chalcocite.

Reduced Oils.

Oils from which the more volatile hydrocarbons have been eliminated and the suspended impurities removed by a combination of filtration and mild evaporation. They are entirely free from any decomposition products due to heating and from chemicals used in processing. They are stated to be valuable lubricants.

Railroad shipping regulations: None.*

Refiner's Syrup. See Molasses.

Refractories

Structural materials for use at high temperatures. In addition to their primary function, they may also be called upon to resist abrasion, corrosion by slags, pressure, and rapid changes in temperature. However, no single refractory will stand up equally well under all of these conditions, consequently, each type has distinctive properties which fit it for certain applications.

The "Ceramic Products Cyclopedia" Chicago, Industrial Publications, Inc., gives three different methods of classifying refractories.

Classification of refractories:

According to method of use:

(1) Those of low heat conductivity, such as tank block and refractory brick which are used in kilns and furnaces.
(2) Those of high heat conductivity such as muffles, retorts and others.

According to their chemical properties:

(1) Acidic.
    (a) Silica.
    (b) Fire-clay.
(2) Neutral.
    (a) High alumina.
    (b) Chrome.
    (c) Silicon carbide.
    (d) Carbon.
(3) Basic.
    (a) Magnesite.
    (b) Dolomite.

According to the material from which they are manufactured:

(1) Clay refractories.
    (a) Those high in clay substance—low in silica.
    (b) Those low in clay substance—high in silica.
(2) Silica refractories.
    (a) Lime bond.
    (b) Clay bond.
(3) Magnesium refractories.
    (a) Natural magnesite.
    (b) Artificial magnesite.
    (c) Spinel—$MgOAl_2O_3$.
(4) Dolomite refractories.
    (a) Natural.
    (b) Artificial.
(5) Aluminous refractories.
    (a) Alumina (bauxite).
    (b) Sillimanite.
(6) Carbon and silicon carbide refractories.
    (a) Clay bond.
    (b) Cementation.
(7) Special refractories.
    (a) Mullite.
    (b) Chrome.
    (c) Zirconia.
    (d) Silica (fused).
    (e) Fused alumina.
(8) Insulating refractories (refractories high in clay substance).
    (a) Open firing at 1,400°C.
    (b) Dense firing at 1,400°C.

Tests for refractories:

The testing of refractories to determine suitability for specific industrial uses presents many complicated problems due to the varied conditions met with in service, all of which have a destructive result but produce widely different effects. M. C. Booze (American Refractories Institute Technologic Paper No. 2, 1926) states "ultimate failure may take place because of spalling, slag erosion, shrinkage, fusion, abrasion, mechanical breakage, or softening, either by heat alone or through acceleration by mechanical stresses. Usually several of these factors act in conjunction, although any one may be instrumental in bringing about destruction. Experience has shown that slag erosion and spalling are the most important factors, because they occur with the greatest frequency."

The principal tests now used for forecasting the life of refractories when in service include porosity and permanent volume changes, spalling, slagging, load tests under various temperatures, thermal conductviity, softening point or pyrometric cone equivalent.

Spalling test: Particulary good for brick to be used for checker work in recuperators and regenerators, glass furnace work, and other operations where sudden temperature changes occur.

Slagging test: Important in connection with glass tank blocks, glass furnace refractories, boiler furnace work, and similar applications in which

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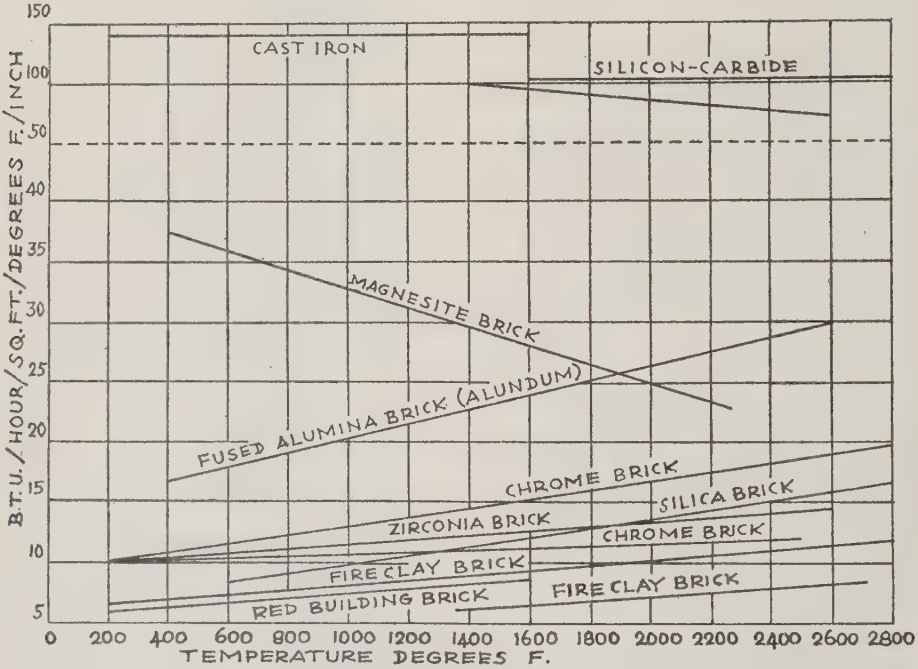
** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

refractories are subjected to attacks by other materials.

Thermal conductivity test: Important since a high conductivity means greater heat loss through uninsulated walls. Where refractories are used as muffles or crucibles, a high conductivity is desirable.

Pyrometric cone equivalent: Valuable in determining the refractoriness of a material. This test establishes the ultimate temperature which a refractory will withstand and the point at which fusing begins.

Load test: The load test gives information on the deformation temperature of a refractory under load.



Courtesy U. G. I. Contracting Co., Physical Laboratory, A. Wishnevsky.

FIG. 1.—Thermal conductivity of various refractory and other materials at different temperatures.

Methods of procedure are prescribed in the American Society for Testing Materials Standards, 1927, Part 2, under the following serial designations:

Porosity and permanent volume changes: C20-20, C27-20; pp. 148 to 150; 165 to 167.

Pyrometric cone equivalent: C24-20, C27-20; pp. 151 to 153; 165 to 167.

Ultimate chemical analysis: C18-21; pp. 154 to 164.

Deformation at high temperature under load: C16-20; pp. 143 to 147.

Spalling: See tentative method of test for resistance of fire-clay brick to spalling action, serial designation C38-26T, Proceedings, American Society for Testing Materials Vol 26, Part 1, p. 784 (1926); also American Society for Testing Materials Tentative Standards, 1926, p. 308.

See also Technical Bulletins 13, 24; and Technologic Papers 1, 2 and 4 of the American Refractories Institute; Proceedings, American Society for Testing Materials Vol 29, Part 1, pp. 282-289 (1929).

For additional information on this subject see: Brick, alumina; brick, chrome; brick, fire; brick, magnesia; brick, silica; brick, zirconia; clays. For brands of refractories sold under proprietary names see specific proprietary name.

"**Refrax.**" A registered proprietary name for recrystallized silicon carbide.

Physical characteristics: Black, with no glaze; porosity 30 to 35%; weight per cubic foot 135 lbs.; does not soften, dissociates at 2,240°C.; refractory product.

Derivation: Recrystallized silicon carbide, 97% SiC.

Grades: Brick and simple shapes.

Containers: Crates.

Uses: Lining for furnaces where great strength is required at extremely high temperatures.

Railroad shipping regulations: None.*

Refrigerating-machinery Oils. See Ice-machine oils.

Regulus of Antimony. See Antimony.

Reinforced Concrete. See Concrete.

Rennet. White powder or solution; active principle which determines the transformation of casein.

Soluble in water.

Derivation: Animal rennet is extracted from the

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

inner lining of the true stomach of a calf. Many species of plants yield vegetable rennet.
Uses: Medicine; pharmacy; cheese-making.
Railroad shipping regulations: None.*

Resaldol. See Resorcinolbenzoylcarbonic acid ethyl ester.

Reseda Oil (Mignonette oil).
Color and properties: Yellow liquid; disagreeable odor, changed into the pleasant mignonette odor when the oil is dissolved in a large amount of alcohol.
Soluble in alcohol and ether.
Derivation: By extraction from the flowers with petroleum ether and evaporation of the latter.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Perfumery.
Railroad shipping regulations: None.*

Residual Oils. Liquid or semi-liquid products obtained as residues from the distillation of petroleum. They contain the asphaltic hydrocarbons. Residual oils are also known as asphaltum oil, liquid asphalt, black oil and flux oil.
Railroad shipping regulations: None.*

Residuum.
A term used in petroleum technology to indicate the residue left in the still after completion of the distillation process. It should be applied to residues left from distillation of crude oils rather than the residues of redistillation of condensates from primary distillations.

Resin Opal. See Opal.

Resin 26-M. A proprietary name for a resin intended as a shellac substitute. It is said to make an excellent addition to nitro-cellulose lacquers to which it imparts unusual durability on outdoor exposure. It is also said to be suitable for use in spirit varnishes, being soluble in alcohol and esters but insoluble in benzene.

Resin E-1. A proprietary name for a hard ester resin said to be adapted to use in both lacquers and oil varnishes. It is of light color and light fast. The acid number lies below 8. It is insoluble in alcohol alone, but soluble in coal-tar hydrocarbons and various mixtures with esters.

Resin TC.
A proprietary name for a synthetic, light-colored, absolutely neutral, unsaponifiable resin. It is stated to be fast to light and resistant to acids and alkalis.
Constants: Softening point 130°C.; m.p. 140° to 150°C. Temperatures up to 200°C. do not markedly darken the resin or its solutions in oils.
Soluble in the coal-tar hydrocarbons, turpentine, tetralin, dekalin, and various mixtures of these with petroleum thinners. Insoluble, or at best soluble only on heating in straight petroleum hydrocarbons. Varnishes made with this resin in the drying oils can usually be thinned with straight petroleum thinners without separation or precipitation.
Uses: High quality oil varnishes, particularly the quick-drying "four hour" type; formulation of extremely fast-schedule oil-base primers and surfacers for use on metal.

Resins, Synthetic.
A complex, amorphous, organic, semi-solid or solid material, usually a mixture of substances; built up by chemical reaction and approximating the natural resins in various physical properties; namely, luster, fracture, comparative brittleness at ordinary temperatures, insolubility in water and fusibility or plasticity when heated or exposed to heat and pressure but commonly deviating widely from natural resins in chemical constitution and behavior with reagents.
Synthetic resins may roughly be divided into two classes: (a) Those made by the action of a resinifying agent on non-resinous substances. Includes the phenol-formaldehyde products, cumaron resin, glycerol and phthalic acid condensation bodies, ketone resins, polymerization products of vinyl compounds, urea and thiourea derivatives and the sulfur-phenol resins. The best known of this group is bakelite, a phenol-formaldehyde product. (b) Those made by the action of chemical agents on natural resins, more especially rosin or colophony, resulting in a substantial modification of composition and properties.
There are a number of synthetic resins on the market. For data on individual resins see under the specific name. See also Resin, true and Resin, gum.
Uses: Cigar and cigarette holders; pipe stems; beads; ornaments; varnishes, lacquers, enamels; cements; molded insulation; coatings; impregnated products; phonograph records; etc.

Resins, True.
A term applied to various vegetable principles occurring in, or obtained from the secretions or saps of certain plants and trees. They are hard, fusible, and more or less brittle, non-adherent to slightly adherent solids at ordinary temperatures, usually light colored in mass, having an amorphous structure, conchoidal fracture and "resinous" luster. They are insoluble in water, but more or less completely soluble in carbon bisulfide, benzene, etc. They are oxidation or polymerization products of the terpenes, and generally contain "resin" acids and esters. For data on individual resins see under the specific name. See also Resin, gum and Synthetic resin.
Railroad shipping regulations: None.*

Resistac. An alloy containing 90% copper, 9% aluminum and 1% iron. It is resistant to dilute sulfuric and acetic acids in the cold.

Resistox. A proprietary name for aldol aniline used as an antioxidant and age resister for rubber. It is a pinkish-yellow waxy substance with sp.gr. 1.12. Used for pure gum and reclaim stocks but not for tire treads.

Resoldol. See Resorcinolbenzoylcarbonic acid ethyl ester.

Resorcin. See Resorcinol.

Resorcinol (Resorcin; Meta-dihydroxybenzene) $C_6H_4(OH)_2$.
Color and properties: Very white crystals, becoming pink on exposure to light when not perfectly pure; unpleasant, sweet taste.
Constants: Sp.gr. 1.2717; m.p. 110°C.; b.p. 380°C.
Soluble in water, alcohol, ether, glycerol, benzene and amyl alcohol.
Derivation: By fusing benzene-meta-disulfonic acid with sodium hydroxide, dissolving the melt in water, acidifying the solution with hydrochloric acid and extracting the resorcinol with a volatile solvent, followed by evaporation of the latter.
Method of purification: Redistillation.
Impurities: Diresorcinol; phenol; salicylic acid.
Grades: U.S.P.; powder; resublimed; pure; reagent; commercial; crude.
Containers: 1, 5 lb. bottles; 5, 25 lb. cans; 100 lb. kegs; 220, 350 lb. barrels.
Uses: Manufacture of dyes; medicine (treatment of skin diseases); hair tonics; reagent in analytical chemistry; celluloid (camphor substitute).
Railroad shipping regulations: None.*
Note: There is also a compound called "resorcinol" obtained by melting the above with iodoform.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Resorcinol Acetate (Acetyl resorcinol; Euresol) $HOC_6H_4OCOCH_3$.
Color and properties: Light yellow oil.
Constants: B.p. 283°C.
Slightly soluble in water, soluble in most organic solvents.
Derivation: Action of acetic anhydride on resorcinol.
Method of purification: Fractional distillation.
Grades: C.P.; N.N.R.
Containers: Glass bottles.
Uses: Medicine (dermatosis, unofficial).
Railroad shipping regulations: None.*

Resorcinol Blue. See Lacmoid.

Resorcinolbenzoylcarbonic Acid Ethyl Ester (Resaldol; Resoldol) $C_{20}H_{14}O_5(CH_3CO)_2$.
Color and properties: Yellowish-brown amorphous powder, tasteless, non-irritant.
Soluble in alkalis; insoluble in water and dilute acids.
Derivation: Reaction between chloromethylsalicylic aldehyde and resorcinol and acetylizing.
Uses: Medicine (tuberculous and other forms of enteritis, unofficial).
Railroad shipping regulations: None.*

Resorcinolphthalein. See Fluorescein.

Retinalite. See Serpentine.

Retinol. See Rosin oil.

Retort Carbon. See Graphite.

Retort Clay. See under Clays.

Rezistals. Ferrous alloys containing in addition to iron the following percentages of other metals: (a) Rezistal 4 contains 24 to 26% nickel, 17 to 18% chromium, 2.5% silicon, 0.15 to 0.25% carbon. It is resistant to all concentrations of hot and cold sodium hydroxide except the concentrated boiling alkali, ammonium hydroxide under all conditions and mine and sea waters. (b) Rezistal 7 contains 25 to 26% chromium, 19 to 21% nickel, 2 to 3% silicon, 0.2% carbon. It is resistant to all concentrations of hot and cold acetic acid. (c) Rezistal 2 C contains 17.5 to 19% chromium, 8 to 9% nickel, 2 to 2.5% silicon, 0.1 to 0.2% carbon. It is resistant to nitric acid under all conditions, to cold acetic acid in all concentrations and to hot dilute acetic acid. It also offers good resistance to hot and cold sodium and ammonium hydroxides, sea and mine waters and moist sulfurous atmospheres. (d) Rezistal 255C contains 24 to 26% nickel, 10 to 12% chromium, 4.5 to 5.5% silicon and 0.15% carbon. It is resistant to cold sulfuric acid in all concentrations and to hot sulfuric acid up to 25% and to hot and cold sodium and ammonium hydroxides. (e) Rezistal 355C contains 34 to 36% nickel, 10 to 12% chromium, 4.5 to 5.5% silicon and 0.15% carbon. It is resistant to all concentrations of sulfuric acid in hot and cold except boiling acid above 10%. It offers good resistance to cold dilute hydrochloric acid up to 3% and to all concentrations of hot and cold sodium and ammonium hydroxides except boiling concentrated sodium hydroxide. Rezistal KA2 contains 17.5 to 19% chromium, 8 to 9% nickel, 0.5% manganese and a maximum of 0.15% carbon. It offers good resistance to nitric acid under all conditions, acetic acid under all conditions except the boiling concentrated acid, hot and cold sodium and ammonium hydroxides, except boiling concentrated sodium hydroxide, sea and mine waters and moist sulfurous atmospheres.

Rezyl Balsams. A trade name for synthetic plasticizers used for all types of nitrocellulose lacquers, both with the rezyls and alone. Stated to be ideal for flexible coatings, airplane and textile fabrics.

Rezyls. A trade name for a series of synthetic resins of a modified glycerol-phthalic anhydride type for use in nitrocellulose lacquers. They impart extreme outdoor durability.

Rhamnus Cathartica (Buckthorn berries).
Dried, ripe fruit of thorny shrub, Rhamnus cathartica.
Habitat: United States, Europe, Western Asia.
Grades: N.F.
Uses: Medicine (cathartic).

Rheum, U.S.P. See Rhubarb.

Rheumatin (Saloquinine salicylate) $C_6H_4OHCOO(C_{20}H_{23}ON_2)C_6H_4OHCOOH$.
Color and properties: White powder, tasteless.
Constants: M.p. 183°C.
Soluble in chloroform and ether; slightly soluble in water.
Uses: Medicine (neuralgia, rheumatism, unofficial).
Railroad shipping regulations: None.*

Rheumatism Weed. See Chimaphila.

Rhigolene.
A petroleum product consisting chiefly of pentane and isopentane (C_5H_{12}). The term rhigolene has also been applied to cymogene (q.v.).
Constants: Sp.gr. 0.625 to 0.631; Bé.gr. 92° to 94°; b.p. 18°C.
Uses: Local anesthetic.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Rhodaform. A compound of sulfocyanic acid methyl ester and hexamethylenetetramine used in medicine as a urine antiseptic. Unofficial.
Railroad shipping regulations: None.*

Rhodanates. The same as sulfocyanates. See under the individual metals which form sulfocyanates.

Rhodanides. The same as sulfocyanides. See under the individual metals which form sulfocyanides.

Rhodinoll. Trade name for a mixture stated to contain approximately 2 parts of citronellol with 1 part geraniol obtained by fractional distillation of geranium oil.
Grades: Technical.
Containers: 1 oz., ½, 1, 5 lb. bottles.
Uses: Making synthetic oil of roses and other perfume materials.

Rhodium Rh.
Color and properties: Grayish-white, ductile, malleable, hard metal.
Constants: Sp.gr. 12.1; m.p. 1,970°C.
Soluble in aqua regia, when alloyed with platinum.
Derivation: By solution of platinum ores or native platinum in aqua regia, successive removal of the iridium and platinum, concentration of the solution and ignition.
Impurities: Platinum; iridium; palladium.
Grades: Metal; powder.
Containers: Canvas sacks.
Uses: Manufacture of rhodium steel; electrical pyrometers.
Railroad shipping regulations: None.*

Rhodium (Rosewood; Convolvulus).
Derivation: Wood of Convolvus scoparius.
Habitat: Canary Islands and West Indies.
Grades: Technical.
Containers: Bags.
Uses: Cabinet making; perfumery; the volatile oil is used as a bait for marten and fox.
Railroad shipping regulations: None.*

Rhodium Oil. An essential oil, of rose-like odor, formerly used to adulterate oil of rose. Its botanical origin was uncertain. It was formerly thought to have been distilled from Convolvulus scoparius, L. and Convolvulus floridus, L. More recently Genista canariensis, L. and Genista virgata, L. have been suggested as the source. Modern oil of rhodium is often sandalwood

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

cedarwood or copaiba oil to which rose oil has been added.
Railroad shipping regulations: None.*

Rhodochrosite $MnCO_3$ with partial replacement by Ca, Mg, Fe.
Light pink, rose-red, brownish-red or brown mineral, white streak, vitreous to pearly luster. Contains 61.7% MnO, 38.3 % Co_2. Found in veins with ores of silver, lead, copper, manganese.
Constants: Sp.gr. 3.3 to 3.6; hardness 3.5 to 4.5.
Occurrence: United States (Connecticut, New Jersey, Colorado, Montana, Nevada), Hungary, Transylvania, Roumania, Germany, Belgium.
Uses: Important manganese ore.

Rhodolite. See Garnet.

Rhodonite $MnSiO_3$ or $MnO.SiO_2$ with replacement by Fe, Zn, Ca.
Light brownish-red, flesh-red or rose-pink mineral, greenish or yellowish when impure, often black outside from exposure. White streak, vitreous luster, somewhat pearly on fracture.
Contains 54.1% MnO, 45.9% SiO_2.
Constants: Sp.gr. 3.4 to 3.68; hardness 5.5 to 6.5.
Occurrence: United States (Maine, Massachusetts, New Jersey, Montana), Russia, Sweden, Hungary, Italy, Australia, Mexico.
Uses: Source of manganese oxides; ornamental stone.

Rhoduline Acid. See 5:5-Dihydroxy-7:7-disulfonic-2:2-dinaphylamine.

Rhubarb (Rheum).
Derivation: The dried rhizome of Rheum officianale, R. palmatum, etc.
Habitat: Central Asia, Europe and southern Siberia.
Chief Constituents: Derivatives of methylanthracene.
Grades: Technical; U.S.P.
Containers: 210 lb. cases; powdered, 200 lb. barrels; packages and cases of various sizes.
Uses: Medicine (laxative).
Railroad shipping regulations: None.*

Rhus Glabra, U.S.P. See Sumac.

Rhus Toxicodendron (Poison ivy; Poison oak; Climbing ivy; Three-leaved ivy; Poison vine).
The leaves of the poison ivy, Rhus toxicodendron.
Chief constituents: Toxicodendrol, toxicodendric acid, resin, gum, rhustannic acid and wax.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Rice's Bromine Solution. A reagent used for the quantitative determination of urea. Bromine 125 grams; sodium bromide 125 grams; wtaer to make 1,000 cc.

Riché Gas.
Derivation: Produced during the dry distillation of wood.
Typical analysis: Carbon dioxide 60%, carbon monoxide 25%, methane 15%, hydrogen small amount.

Ricin. The tox-albumin of the castor oil bean, being the poisonous principle. Extracted from the pressed seeds with 10% solution of sodium chloride followed by precipitation with magnesium sulfate.
Railroad shipping regulations: None.*

Ricinine $C_8H_8O_2N_2$.
Color and properties: White crystalline alkaloid.
Constants: M.p. 201.5°C.
Derivation: From castor oil seeds.
Railroad shipping regulations: None.*

Ricinola Oil. See Castor oil.

Ricinoleic Acid $C_{17}H_{32}(OH)COOH$.
Color and properties: Yellowish, viscid liquid (solid at 15°C.).
Constants: Sp.gr. 0.945; m.p. 16°C.; b.p. 250°C.
Soluble in alcohol, ether and chloroform; insoluble in water.
Derivation: Saponification of castor oil.
Method of purification: Rectification.
Grades: Technical.
Containers: Wooden barrels.
Uses: Soaps; Turkey red oils; textile finishing.
Railroad shipping regulations: None.*

Ricinus (Castor oil plant; Palma christi; Mexico seed; Oil plant; Castor bean).
Derivation: The seeds of Ricinus commonus.
Habitat: United States, East Indies, West Indies, southern Europe and Africa.
Grades: Technical.
Containers: Bags.
Uses: Source of castor oil.
Railroad shipping regulations: None.*

Ricinus Oil. See Castor oil.

Ricolite. See Serpentine.

Riegler's Test. A reagent composed of sodium naphthionate and beta-naphthol, for the detection of nitrous acid in very small amounts.

Riga Balsam (Carpatic balsam).
Color and properties: Thin white juice with odor analogous to juniper.
Derivation: Exudation from extremities of young twigs of a large tree (Pinus cerubra) growing in mountainous and northern Europe and in Siberia.
Containers: Bottles.
Uses: Medicine (unofficial).
Railroad shipping regulations: None.*

Rinmann's Green. See Cobalt zincate.

Road Oil. A rather broad term used in the petroleum industry to describe a wide range of products sold for use as a dust preventative on roads, playgrounds, drillgrounds, etc. A typical light grade used as a settler would run 24° to 25° Bé., an intermediate grade 22° to 23° Bé., and a heavy road oil or binder used on macadam and dirt roads 20° to 21° Bé.
Constants of some Oklahoma oils: (1) Gr. 30° to 34° Bé.; flash point (New York oil tester) 250°F.; fire point 300°F.; viscosity (Engler) 132 seconds at 60°F.; evaporation after 5 hours 1.1% at 212°F. (2) Gr. 26° to 30° Bé.; flash point (New York oil tester) 330°F.; fire point 390°F.; viscosity (Engler) 563 seconds at 60°F.; evaporation after 5 hours 0.2% at 212°F. (3) Gr. 24° to 26° Bé.; flash point (New York oil tester) 160°F.; fire point 220°F.; viscosity (Engler) 715 seconds at 77°F.; fixed carbon 1.5%; evaporation after 5 hours 4.38% at 212°F.; asphaltic content 40%. (4) Gr. 20° to 22° Bé.; flash point (New York oil tester) 350°F.; fire point 400°F.; viscosity (Engler) 120 seconds at 212°F.; fixed carbon 2.5%; evaporation after 5 hours 3.38% at 325°F.; asphaltic content 54%. (5) Gr. 18° to 20°Bé.; flash point (New York oil tester) 420°F.; fire point 530°F.; viscosity (Engler) 276 seconds at 212°F.; fixed carbon 3.9%; evaporation after 5 hours 0.45% at 325°F.; asphaltic content 77%. (6) Gr. 16° to 18° Bé.; flash point (New York oil tester) 410°F.; fire point 540°F.; viscosity (Engler) 320 seconds at 212°F.; fixed carbon 4.4%; evaporation after 5 hours 0.65% at 325°F.; asphaltic content 81%.
Railroad shipping regulations: None.*

Rochelle Salt. See Potassium-sodium tartrate.

Rock Asphalt.
Sandstone or limestone impregnated with asphalt by nature.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Rock Candy.
Semi-transparent crystals of hydrated sugar, the purest form of sucrose commercially obtainable.
Derivation: Gently heating concentrated sugar syrup, adding alcohol, and cooling slowly.

Rock Crystal.
A colorless and very pure quartz (q.v.). Includes the variety known as Brazilian pebbles, Marmorosch diamonds, Lake George diamonds, Bristol diamonds.

Rock Gypsum. See Gypsum.

Rock Oil. A synonym for petroleum (q.v.).

Rock Salt. See Halite.

Rock Salt Moss. See Chondrus.

Rock Wool. See Mineral wool.

Rocky Mountain Grape Rhizome and Roots. See Berberis.

Rod Wax.
A paste-like mass, light yellow in color, which collects around the rods and casings of some of the Pennsylvania oil wells. It is essentially an emulsion of high boiling oils with solid hydrocarbons.

Rol-man Manganese Steel. A ferrous alloy containing in addition to iron 11 to 14% manganese and 1 to 1.3% carbon.

Roll-knobbling. See Spellerizing.

Roman Cement. See under Cements, structural.

Roman Chamomile. See Anthemis.

Rongalite C. Trade name for hydrosulfite-formaldehyde compounds (q.v.).

Rongalite C. Concentrated. Trade name for hydrosulfite-formaldehyde compounds (q.v.).

Ronopole Oil. Trade name for a highly oxidized sulfonated castor oil, produced under a special process. It finds its principal use in the textile and leather industries. It is stated to be perfectly soluble in water and is adapted for use in the dyeing and finishing of textiles, and in the leather trade has the advantage of serving as a finishing oil and softening agent. For textiles, it promotes penetration of the dye, assists in level dyeings and possesses good softening power.

Ronopole Soap. Trade name for a highly oxidized sulfonated castor oil, in soap form, made under a special process. It is said to be used generally in the rayon and silk dyeing industry for softening and for assisting in dyeing and improving brilliancy of the color.

Rosa Gallica (French rose; Dutch rose; Provins rose; Red rose; Rose leaves).
Derivation: Dried petals of Rosa gallica.
Grades: Technical; U.S.P.
Containers: 5, 10, 25 lb. packages.
Uses: Medicine; perfumery; flavoring; source of rose oil.
Railroad shipping regulations: None.*

Roscoelite.
One of the species of mica (q.v.). Essentially a vanadium mica. The composition is doubtful but is thought to be similar to a muscovite with the alumina largely replaced by vanadous oxide. The percentage of V_2O_3 is variable and sometimes is as much as 28%. It consists of minute scales with micaceous cleavage, dark green to brown in color with pearly luster.
Constants: Sp.gr. 2.92 to 2.94; hardness 2.
Occurrence: United States (California, Colorado), Australia.
Uses: Sometimes used as a source of vanadium.

Rose Geranium Oil. See Geranium oil, rose.

Rose Leaves. See Rosa gallica.

Rose Oil (Otto of rose oil).
Color and properties: Pale, yellow, pale green, or pale red, transparent, volatile, liquid oil; mild, sweet taste; strong, fragrant odor; semi-solid at ordinary temperature.
Chief constituents: Geraniol, citronellol and phenylethyl alcohol.
Constants: Sp.gr. 0.845 to 0.865; solidifying-point 18° to 37°C.; saponification value 10 to 17; acid value 0.5 to 3.
Derivation: (a) By steam distillation of the fresh flowers of Rosa damascena. (b) By extraction from the flowers of Rosa centifolia.
Grades: Bulgarian; Anatolian; French.
Containers: 1, 8, 16 oz. bottles; 1, 8, 16, 32 oz. packages; 1, 2 kilo packages.
Uses: Perfumes; flavoring.
Railroad shipping regulations: None.*

Rose Oil, Synthetic. Combinations of varying proportions of true rose oil with citronellol, geraniol, phenylethyl alcohol, nerol, etc.

Rose Quartz. See Quartz.

Roseine. See Fuchsin.

Rosemary (Garden rosemary).
Derivation: Flowers and leaves of Rosmarinus officinalis.
Habitat: Mediterranean basin; cultivated in gardens.
Grades: Technical.
Containers: Boxes.
Uses: Perfumery.
Railroad shipping regulations: None.*

Rosemary Oil.
Colorless or pale yellow, limpid liquid, volatile oil; warm, somewhat camphoraceous taste; pungent, rosemary odor.
Chief known constituents: Pinene, borneol, camphene, cineole, camphor and bornyl acetate.
Constants: Sp.gr. 0.894 to 0.920; optical rotation −9° to +18°; saponification value 12 to 20.
Soluble in alcohol, ether, and glacial acetic acid.
Derivation: By distillation from the leaves of Rosamarinus officinalis, habitat: southern Europe.
Grades: Technical; U.S.P.
Containers: 5, 10 lb. bottles; 25, 27½ lb. tins; 55, 110 gal. drums.
Uses: Perfumery; medicine (carminative).
Railroad shipping regulations: None.*

Rosemary Oil, Terpeneless.
Concentration: About 6 times that of the ordinary rosemary oil.
Constants: Sp.gr. 0.939 to 0.94.
Solubility in alcohol: 20 vols. in 100 vols. of 60% alcohol; 60, 70 vols. in 100 vols. of 70% alcohol.
Railroad shipping regulations: None.*

Rosendale Cement. See under Cements, structural.

Rosenstiehl's Green. See Barium manganate.

Rose's Metal. See table under Fusible metals.

Rosin. See Colophony.

Rosin Essence. That portion of rosin distilling below 360°C.

Rosin Oil (Retinol; Rosinol; Codoil).
Color and properties: Water-white to brown liquid; odorless; strong, peculiar taste.
Constants: Sp.gr. 0.980 to 1.110.
Soluble in ether, chloroform, fatty oils and carbon bisulfide; slightly soluble in alcohol.
Derivation: By fractional distillation of rosin in a retort, that portion distilling above 360°C. being rosin oil.
Method of purification: Treatment with sulfuric acid, followed by lime water and subsequent distillation.
Grades: Technical (first, second, third run).
Containers: 50 gal. wooden barrels.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Lubricant; adulterant for boiled linseed oil; printing inks.

Railroad shipping regulations: None.*

Rosin Soap. See Soap.

Rosin, White. Colophony which has been strongly agitated with water while in a state of fusion.

Rosinjack. See Sphalerite.

Rosinol. See Rosin oil.

Rosinweed Root.

Root of Silphium laciniatum, a plant growing in Ohio, which yields an oleoresin said to be used in making chewing gum.

Rosolic Acid (Para-rosolic acid) $C_{20}H_{16}O_3$.

Color and properties: Red lumps.

Constants: M.p. 270°C.

Soluble in alcohol and ether; slightly soluble in water.

Derivation: By oxidizing a mixture of phenol and cresol with arsenic acid and sulfuric acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: 1 lb. bottles; wooden barrels; kegs.

Uses: Dyes; analytical chemistry.

Railroad shipping regulations: None.*

Rosolic Acid, Para-. See Rosolic acid.

Rotten-stone. See Tripoli.

Rouge.

A high-grade red pigment used also as a polishing compound. It is similar to Venetian red (q.v.). See also Ferric oxide, red.

Rouge, Black. See Ferric oxide, black.

Rowlandite. Natural yttrium silicate, $2Yt_2O_3.3SiO_2$, from Texas.

Royal Yellow. See Orpiment (pigment).

Rubber. See Caoutchouc.

Rubber-covered Metal. Any metal to which has been applied any grade of rubber by a process of vulcanization of the rubber direct to the metal.

Description of process: The process consists of cleaning down to bright metal (sandblasting or pickling); applying cement or plating metal with brass, as process may require; applying the uncured rubber, being sure to exclude all air between rubber and metal; vulcanizing or heating under pressure and finally cooling under pressure. It is during the vulcanizing and cooling process that the adhesion is set up.

List of corrosives for which covered metal has shown successful service:

LIQUID ACIDS

	Concentration by Weight %	Maximum Temperature °F.
Acetic	Any Concentration	130
Hydrobromic	Concentrated	100
Hydrofluoric	Not Concentrated	150
Hydrofluosilicic	Any Concentration	150
Muriatic (Hydrochloric)	Concentrated	150
†Phosphoric	Up to 85%	125
‡Sulfuric	Up to 50%	150
Formic	Commercial	130

SOLUTIONS

Aluminum Sulfate (Alum)	Saturation	150
Ammonia Chloride	Saturation	150
Ammonium Sulfate	Saturation	150
Calcium Chloride	Up to Saturation	150
Calcium Hypochlorite	Up to Saturation	150
Caustic Soda and Potash	Up to Saturation	150
Chlorinated Water		
Ferric Chloride	Saturation	150
Ferrous Sulfate	Saturation	150
Milk of Lime	Any Concentration	125
Nickel Salts	Any Concentration	180
Sodium Acid Sulfate	Up to Saturation	150
Sodium Chloride	Saturation	150
Sodium Cyanide	Saturation	150
Sodium Hypochlorite	Up to Saturation	150
Zinc Chloride	50%	100
Zinc Sulfate	Saturation	150

ORGANIC LIQUIDS

Acetone		130
Ethyl Alcohol	Any Concentration	140
Formalin	Commercial	100
Methyl Alcohol	Any Concentration	180

† Regular rubber compounds slightly discolor phosphoric acid but, if desired, a special rubber compound can be prepared which will cause no discoloration.

‡ Slight discoloration of liquid may occur at any concentration above 10%.

Uses: Abrasion-resistant lining for sand and gravel chutes, etc.; corrosion-resistant lining for pipe, valves and fittings, acid storage tanks, acid tank cars, fans and blowers, rotary filters, centrifugal baskets, drums, barrels, centrifugal pumps, rubber-covered bleach rods and dyesticks. Actively used in following industries: Heavy and fine chemicals, rayon, paper, steel, textile dyeing and bleaching, fertilizer, laundry, plating and galvanizing, foodstuffs, mining and cement.

Rubber-plated Metal. Metal with a coating of rubber applied by "electrodeposition" or "ionic coagulation" from latex or artificial dispersions of rubber; compounded and vulcanized to meet the service conditions. In forming a rubber coating by electrodeposition the surface to be covered is made the positive electrode and the layer is built up by the migration of the rubber particles toward this positive electrode and their coagulation thereon by positively charged ions formed at that electrode by the passage of the current.

In ionic coagulation no electric current is employed. In this case the positively charged coagulating ions necessary to build up the rubber layer from the latex or rubber dispersion are supplied entirely by diffusion from a surface layer of salts or acids, which has been applied mechanically to the surface to be rubber covered. In either case the freshly deposited layer of rubber contains a large percentage of water and some soluble materials and hence is washed and dried before vulcanization.

The properties of the vulcanized coating may be varied from those of a soft, highly resilient rubber to a hard ebonite.

In general, rubber plating is applied to metal for the following reasons: (1) Protection against corrosion; (2) electrical insulation; (3) protection against abrasion or to furnish a cushioned surface. Hard rubber coatings furnish the greatest resistance to corrosion and soft the greatest resistance to abrasion. Either hard or soft rubber coatings are satisfactory for electrical insulation.

Specific applications in each of the above three fields are as follows: (1) Corrosion resistance (dipping baskets, fan and pump rotors, centrifuge baskets, conveyor pins, spinnerette tubes, and bobbins); (2) electrical insulation (plating racks, pliers, screw drivers, lamp guards); (3) abrasion resistance (screen, perforated metal, conveyor buckets, and dishwashing racks).

Rubellite. One of the Tourmalines.

Rubens Brown. See Van Dyke brown.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Rubidium Rb.
Color and properties: Soft, silvery-white metal; very easily oxidized in air. Must be kept immersed in naphtha, kerosene or the like.
Constants: Sp.gr. 1.532; m.p. 39°C.; b.p. 696°C.
Soluble in acids and alcohol; decomposes water.
Derivation: (a) Rubidium chloride is fused and electrolyzed. (b) Rubidium hydroxide is heated with aluminum in a current of hydrogen.
Method of purification: Redistillation.
Grades: Technical.
Containers: Glass bottles.
Uses: Rubidium salts.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Rubrica.
A fine red pigment consisting, essentially, of red iron oxide. See also: Ferric oxide, red and Hematite, red.

Rubus (Blackberry bark).
The dried root-bark of the blackberry, Eubatus rubus.
Habitat: Eastern United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (diarrhea).
Railroad shipping regulations: None.*

Ruby. See Corundum.

Ruby Wood. See Santalum rubrum.

Ruddle. See Hematite, red.

Rue Oil.
Color and properties: Essential oil; colorless to yellow; usually fluoresces; intense, persistent, characteristic odor.
Chief known constituents: Methyl-n-ketone, methyl-n-heptyl ketone.
Constants: Variable, according to botanical origin and vegetative condition of plant at time of distillation.
Source:
French. Sp.gr. 0.8328 to 0.8437 (15°C.); optical rotation —0° 40′ to +2° 10′; refractive index 1.430 to 1.434; soluble in 1.5 to 3 vols. of 70% alcohol.
Spanish. Sp.gr. 0.834 to 0.847 (15°C.); optical rotation —1° to +0° 30′; soluble in 2 to 4 vols. of 70% alcohol.
Syrian. Sp.gr. 0.8408 (15°C.); optical rotation —0° 28′; refractive index 1.43296; soluble in 2 or more vols. of 70% alcohol.
Algerian from Ruta montana. Sp.gr. 0.8370 to 0.8381 (15°C.); optical rotation ±0° to +0° 56′; refractive index 1.430 to 1.432; soluble in 2 to 3 vols. or more of 70% alcohol with separation of paraffin.
Algerian from Ruta bracteosa. Sp.gr. 0.8373 to 0.8446 (15°C.); optical rotation —1° 14′ to —5°; refractive index (about) 1.430; soluble in 2 to 3 vols. of 70% alcohol with occasional turbidity.
Derivation: Distilled from various species of the genus Ruta.
Adulteration: Mineral oil: turpentine oil.
Containers: Bottles.
Uses: Veterinary medicine; organic synthesis.
Railroad shipping regulations: None.*

Rumanian Blistering Flies. See Cantharides.

Rumex (Yellow dock; Curled dock).
Dried root of Rumex crispus or obtusifolius.
Habitat: United States, Europe.
Chief constituent: Tannins.
Grades: N.F.
Uses: Medicine (mild laxative and astringent).

Rusa Oil. See Palmarosa oil.

Russian Blistering Flies. See Cantharides.

Ruthenium Ru.
Color and properties: Brittle metal.
Constants: Sp.gr. 8.6; m.p. above 1,950°C.
Insoluble in water, alcohol and ether.
Derivation: From platinum ore.
Grades: Technical.
Containers: Glass bottles.
Uses: Ruthenium salts; alloys.
Railroad shipping regulations: None.*

Ruthenium Red (Ammoniated rutherium oxychloride) $Ru_2(OH)_2Cl_4.7NH_3.3H_2O$.
Color and properties: A brownish-red powder.
Soluble in water.
Uses: Microscopic stain and reagent for pectin, plant mucin and gum.

Rutile (Nigrine) TiO_2.
Reddish-brown, red, black, deep red (when transparent) mineral of adamantine to nearly metallic luster. Crystals are often included in other minerals in hair-like or needle-like penetrations. Coarse crystals embedded in quartz and feldspar. Also found in shales, bauxite deposits. Occasionally massive when black and iron bearing. Distinguished from cassevite by its redness and lower specific gravity and from garnet, tourmaline, vesuvianite and pyroxene by its luster, weight and infusibility.
Contains 61% Ti. Insoluble in acids.
Constants: Sp.gr. 4.15 to 4.25; hardness 6 to 6.5.
Occurrence: United States (Georgia, Arkansas, North Carolina, South Carolina, Colorado, Virginia, Connecticut).
Uses: Most important and plentiful source of titanium; artificial teeth (tinting); porcelain (tinting); titanium carbide electrodes, titanium compounds.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

S

S Acid. See 1-Amino-8-naphthol-4-sulfonic acid, 1-naphthylamine-4:8-disulfonic acid and 1-naphthylamine-8-sulfonic acid.

S S Acid. See 1-Amino-8-naphthol-2:4-disulfonic acid.

2S Acid. See 1-Amino-8-naphthol-2:4-disulfonic acid.

Sabadilla (Cevadilla; Indian barley-caustic).
Derivation: Seeds of Asagraea officinalis.
Habitat: Mexico to Guatemala and Venezuela.
Grades: Technical.
Containers: Bags.
Uses: Medicine: source of veratrine.
Railroad shipping regulations: None.*

Sabal (Saw palmetto).
Derivation: Partly dried ripe berries of Sabal serrulata, R. et Sch.
Habitat: South Carolina to Florida and West Indies.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (stimulant alterative for mucous membrane).
Railroad shipping regulations: None.*

Sabal Oil (Oil of saw palmetto).
Color and properties: Brown-colored oil.
Chief known constituents: Capronic, caprylic, caprinic, lauric, palmitic and oleic acids.
Constants: Sp.gr. 0.8650 to 0.8653.
Derivation: By distilling with water vapor the oil separated from the expressed juice of the fresh berries of Sabal serrulata, R. et Sch.
Railroad shipping regulations: None.*

Sabina. See Savin.

Sabromin. See Calcium dibromobehenate.

Saccharin (Benzoylsulfonic imide; Benzosulfimide; Benzoic sulfimide, ortho-; Neo-saccharin; Gluside; Saccharol; Glycosine; Saxin; Sykose; Glusimide; Garantose; Glycophenol; Saccharinol; Saccharinose. The anhydride of ortho-sulfimide benzoic acid. $C_6H_4COSO_2NH$.
Color and properties: White, crystalline powder; exceedingly sweet taste (500 times that of cane-sugar).
Constants: M.p.: Decomposes at 220°C.
Soluble in amyl acetate, ethyl acetate, benzene and alcohol; slightly soluble in water.
Derivation: A mixture of toluenesulfonic acids is converted into the sodium salt, then distilled with phosphorus trichloride and chlorine to obtain the ortho-compound, which, by means of ammonia is converted into ortho-toluenesulfamide. This is oxidized with permanganate to the alkali salt of ortho-benzenesulfaminic acid and the latter treated with acid and saccharin crystallized out.
Method of purification: Recrystallization.
Grades: Commercial; C.P.; U.S.P.
Containers: 1 lb. bottles; ¼, 1, 5, 10, 25 lb. cans; 100 lb. cases.
Uses: Manufacture of syrups; medicine (substitute for sugar, particularly in diabetes); sweetening champagne, oils, soft drinks, foods, etc.
Railroad shipping regulations: None.*

Saccharin, Soluble. See Sodium benzosulfimide.

Saccharinol. See Saccharin.

Saccharinose. See Saccharin.

Saccharol. See Saccharin.

Saccharolactic Acid. See Mucic acid.

Saccharose. See Sugar, cane.

Saccharum, U.S.P. See Sugar, cane.

Saccharum Lactis. See Lactose.

Sacred Bark. See Cascara sagrada bark.

Safety-lamp Gasoline. A gasoline of 66° to 68° Bé. is stated to be suitable for this purpose.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Safety-lamp Oil. A mixture of 60% sperm oil and 40% mineral seal oil is stated to make a satisfactory safety-lamp oil.
Railroad shipping regulations: None.*

Safflower. See Carthamus.

Saffron. See Crocus.

Safranine. A dye also known as aniline rose or aniline pink, prepared by oxidizing para-toluylenediamine, aniline and ortho-toluidine.

Safrole (Allylpyrocatecholmethylene ether; Shikimol; Propyldioxybenzenemethylene ester) $C_3H_5C_6H_3O_2CH_3$.
Color and properties: A colorless or pale yellow, liquid oil; odor of sassafras; is the odor-giving constituent of sassafras, camphor-wood and other oils; poisonous!
Constants: Sp.gr. 1.0960; solidifying-point −20°C.; m.p. 11°C.; b.p. 233°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From oil of sassafras or camphor oil.
Method of purification: Rectification or freezing.
Grades: Technical.
Containers: 1, 5, 10 lb. bottles; 60 lb. cans.
Uses: Perfumery and soaps; manufacture of heliotropin, piperonal; medicine.
Railroad shipping regulations: None.*

Sage. See Salvia.

Sage Oil (Salvia oil).
Color and properties: Yellowish or greenish-yellow liquid; penetrating sage odor.
Chief known constituents: Cineole; thujone; pinene.
Constants: Sp.gr. 0.915 to 0.925; optical rotation +10° to +25°; saponification value 107.
Soluble in alcohol.
Derivation: By distillation from the leaves of Salvia officinalis.
Grades: Technical.
Containers: Glass bottles; copper flasks.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Sagger Clay. See under Clays.

Sago Dextrin. See Dextrin.

St. Ann's Bark. See Cinchona bark, succirubra.

St. Ignatius Beans (Ignatia).
Derivation: The bean of Ignata amara.
Habitat: Philippine Islands.
Grades: Commercial.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

St. John's Bread. See Hypericum.

St. John's Wort. See Hypericum.

Sajodin. See Calcium iodobehenate.

Sal Acetosella. See Potassium binoxalate.

Sal Ammoniac. See Ammonium chloride.

Sal Chalybis. See Ferrous sulfate.

Sal Prunella. See Niter balls.

Sal Soda (Washing Soda).
Sal soda or washing soda is a crystalline form of sodium carbonate containing 10 molecules of water ($Na_2CO_3.10H_2O$). Although soda crystals if chemically pure only contain 37.08% of sodium carbonate, or 21.71% of sodium oxide, and thus cost more than their equivalent amount of soda ash for package and freight, they are preferred to soda ash in some cases, especially for household washing purposes. The large use of soda crystals in the past may be attributed to the fact that they were very pure and contained no caustic soda. This absence of caustic soda gave them a preference over soda ash for washing wool, fabrics, and household cleaning. The soda ash now produced by the "ammonia-soda" process contains no trace of caustic soda and has practically replaced soda crystals for industrial purposes. The soda crystals, however, have retained their wide use for household purpose, as they dissolve more easily and are easier to handle than soda ash.
Railroad shipping regulations: None.*

Sal Tartar. See Sodium tartrate.

Salacetol. See Salicylacetal.

Salad Oil. Any edible oil, used for making salad-dressing, usually olive or cottonseed oil.

Salantol. See Salicylacetal.

Salazolon. See Antipyrine salicylate.

Salicin. A glucoside obtained from several species of Salix and Populus.
Color and properties: Colorless crystals or white powder.
Soluble in water and alcohol.
Constants: M.p. 199° to 202°C.
Grades: U.S.P.
Containers: 1 oz., ¼, 1 lb. cartons; 1, 5, 25 lb. cans.
Uses: Medicine (bitter).

Salicitrin. See Methylenecitrosalicylic acid.

Salicor. See Blanquette.

Salicylacetal (Saligylacetol; Salacetol; Salantol). $C_6H_4(OH)COOCH_2COCH_3$.
Color and properties: White or pinkish needles.
Constants: Fusing point 71°C.
Slightly soluble in alcohol, cold water; soluble in ether, chloroform, petroleum benzine.
Uses: Medicine (substitute for salol to avoid elimination of phenol in the system, unofficial).
Railroad shipping regulations: None.*

Salicylacetol. See Salicylacetal.

Salicyl-alpha-methylphenylhydrazine (Agathin; Cosmin; Salizone) $C_6H_5(CH_3)NNHCO(C_6H_4OH)$.
Color and properties: Yellowish crystals, odorless and tasteless.
Soluble in alcohol, ether.
Derivation: By the action of salicylic aldehyde on alpha-methylphenylhydrazine.
Uses: Medicine, in the treatment of neuralgia and rheumatism (unofficial).
Railroad shipping regulations: None.*

Salicylamide $C_6H_4(OH)CONH_2$.
Color and properties: Colorless, tasteless, gritty, crystalline plates.
Constants: M.p. 139.9°C.; b.p.: Decomposes at 270°C.
Soluble in alcohol, ether and chloroform; slightly soluble in water.
Derivation: Treatment of methyl salicylate with dry ammonia gas.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Salicylated Mercury. See Mercuric salicylate.

Salicylic Acid (Hydroxybenzoic acid, ortho-) $C_6H_4(OH)(COOH)$.
Color and properties: White needle crystals or powder.
Constants: Sp.gr. 1.483; m.p. 156° to 159°C.
Soluble in acetone, oil of turpentine, alcohol, ether.
Derivation: By treatment of a hot solution of sodium phenolate with carbon dioxide, and acidifying the sodium salt thus formed.
Method of purification: Sublimation.
Grades: Technical; C.P.; U.S.P.
Containers: 1 lb. bottles; 5 lb. cans; barrels; boxes.
Uses: Preservative; dyes; perfumes; medicine (antiseptic, analgesic, rheumatism).
Railroad shipping regulations: None.*

Salicylic Acid Methylene Acetate. See Indoform.

Salicylic Acid Methoxymethyl Ester (Mesotan; Salmester; Ericin) $C_6H_4OHCOO(CH_2OCH_3)$.
Color and properties: Clear yellow liquid, miscible with oils in all proportions, peculiar odor. Burns the skin unless diluted with vegetable oils or petrolatum.
Constants: Sp.gr. 1.2; b.p. 162°C.
Slightly soluble in water, readily soluble in usual organic solvents.
Uses: Medicine (counter-irritant in rheumatism, unofficial).
Railroad shipping regulations: None.*

Salicylic Acid Phenyl Ester. See Salol.

Salicylic Acid, Salicylic Ester (Salicylosalicylic acid; Salicylsalicylate; Diplosal; Salysal) $OHC_6H_4COOC_6H_4COOH$.
Color and properties: White crystalline powder.
Insoluble in water and dilute acids.
Uses: Medicine (antirheumatic, unofficial).
Railroad shipping regulations: None.*

Salicylic Aldehyde. See Salicylous acid.

Salicylic Glycerinester. See Glycosal.

Salicylicnaphthyl Ester. See Naphthyl salicylate, beta-.

Salicylous Acid (Salicylic aldehyde; Ortho-oxybenzaldehyde) C_6H_4OHCOH.
Color and properties: Yellow oil; aromatic odor.
Constants: Sp.gr. 1.165 to 1.172; m.p. —10°C.; b.p. 196°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: By the interaction of phenol and chloroform in presence of aqueous alkali.
Method of purification: Distillation.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry; perfumery (violet); synthesis of coumarin.
Railroad shipping regulations: None.*

Silicylosalicylate. See Salicylic acid, salicylic ester.

Salicylosalicylic Acid. See Salicylic acid, salicylic ester.

Salicyl-para-phenetidine (Malakin; Phenosal) $C_2H_5OC_6H_4NHCOC_6H_4OH.H_2O$.
Color and properties: Small, fine, bright yellow needles.
Constants: M.p. 92°C.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Insoluble in water; soluble in sodium hydroxide and hot alcohol.
Uses: Medicine (antipyretic, antirheumatic, anthelmintic, unofficial).
Railroad shipping regulations: None.*

Saliformin (Hexamethylenetetramine salicylate) $C_8H_{12}N_4C_6H_4OHCOOH$.
Color and properties: White crystalline powder, pleasant acidulous taste.
Soluble in alcohol and water.
Uses: Medicine (uric acid solvent, genito-urinary antiseptic, unofficial).
Railroad shipping regulations: None.*

Salimenthol. See Menthyl salicylate.

Salinaphthol. See Naphthyl salicylate, beta-.

Salipyrine. See Antipyrine salicylate.

Salit (Borneol salicylate) $C_{10}H_{17}OCOC_6H_4OH$.
Color and properties: Oily liquid. Incompatible with alkalis and alkaline salts.
Insoluble in water; soluble in alcohol, ether and oils.
Uses: Medicine (endermic in neuralgia and rheumatism, unofficial).
Railroad shipping regulations: None.*

Salizone. See Salicyl-alpha-methylphenylhydrazine.

Salmester. See Salicylic acid methoxymethyl ester.

Salmite. See Micas, brittle.

Salmon Oil
Color and properties: Pale golden-yellow liquid; mild, sweet, tolerably pleasant taste.
Constants: Sp.gr. 0.9258; saponification value 182 to 188; iodine value 161.
Soluble in ether, alcohol, chloroform, benzine and carbon bisulfide.
Derivation: A by-product of the salmon canning industry.
Method of purification: Filtration.
Grades: Crude; refined.
Containers: Wooden barrels.
Uses: Soap; leather dressing.
Railroad shipping regulations: None.*

Salol (Phenyl salicylate; Salicylic acid phenyl ester) $C_6H_4OHCOOC_6H_5$.
Color and properties: White crystalline powder; faint, aromatic odor.
Constants: Sp.gr. 1.2614; m.p. 41.9°C.; b.p. 172° to 173°C.
Soluble in alcohol, ether, chloroform, benzene and fixed or volatile oils; sparingly soluble in water.
Derivation: By heating salicylic acid and phenol with phosphorus pentachloride or other dehydrating agent.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: 1 lb. bottles; 5, 25, 50 lb. boxes; 100 lb. kegs.
Uses: Medicine (internal antiseptic).
Railroad shipping regulations: None.*

Saloop. See Sassafras bark.

Salophen (Acetoaminosalol; Acetyl-para-aminosalol; Acetyl-para-aminophenyl salicylate). $C_6H_4OHCOOC_6H_4NHCOCH_3$.
Color and properties: Fine, white, crystalline scales; odorless; tasteless.
Constants: M.p. 187° to 188°C.
Soluble in alcohol, ether, benzene, dilute solutions of the alkalis and hot water; insoluble in benzine; decomposed by strong alkalis.
Derivation: By reducing para-nitrophenol salicylate to para-aminophenol salicylate and acetylating the latter.
Method of purification: Recrystallization.
Grades: Technical; pure.
Containers: Tins; glass bottles.
Uses: Medicine (rheumatic, antiseptic, analgesic).
Railroad shipping regulations: None.*

Saloquinine (Quinine ester of salicylic acid) $C_6H_4OHCOOC_{20}H_{23}N_2O$.
Color and properties: Colorless crystals, tasteless. Contains 70% quinine. Decomposed by acids or acid salts.
Constants: Fusing point 130°C.
Uses: Medicine (malarias, neuralgias, rheumatism, fulgurant pains, antipyretic in typhoid and fevers, antiperiodic, unofficial).
Railroad shipping regulations: None.*

Saloquinine Salicylate. See Rheumatin.

Salt, Bay.
A salt of coarser grain than that made by the evaporation of sea water.

Salt, Black.
A monohydrated sodium carbonate containing some caustic soda, obtained in the Leblanc soda process.

Salt Cake. The lumps obtained in the furnaces in the manufacture of hydrochloric acid and sodium sulfate, consisting of 92 to 99% of sodium sulfate, and containing sodium bisulfate, calcium sulfate, iron sulfate, iron oxide, magnesium sulfate, silica and sodium chloride as impurities.
Grades: Technical, glassmakers' (iron-free).
Containers: 200 lb. bags; 500 lb. barrels; carloads.
Uses: Water glass; plate and window glass; sodium salts; ceramic glazes; ultramarine; diluting dyes; paper pulp; soap; detergent compositions.

Salt, Common. See Sodium chloride.

Salt, Epsom. See Magnesium sulfate.

Salt, Glauber's. See Glauber's salt.

Salt Lick. See Pan scale.

Salt of Lemery. Potassium sulfate (q.v.).

Salt of Lemon. See Potassium binoxalate.

Salt of Phosphorus. See Sodium ammonium phosphate.

Salt of Sorrel. See Potassium binoxalate.

Salt of Tartar. See Potassium carbonate.

Saltpeter. See Niter (Saltpeter).

Saltpeter, Chile. See Caliche.

Saltpeter, Cubic. See Caliche.

Saltpeter, Soda. See Caliche.

Saltpetre. See Niter (Saltpeter).

"Salt, Preparing." See Sodium stannate.

Salt, Rock. See Halite.

Salt, Sea. See Sodium chloride.

"Salt, Silver." The sodium salt of anthraquinonesulfonic acid.

Salt, Table. See Sodium chloride.

Salt, Tin. See Stannous chloride.

Salufer. See Sodium silicofluoride.

Salumin (Aluminum salicylate) $Al(C_6H_4OHCOO)_3$.
Color and properties: Reddish-white powder.
Soluble in dilute alkalis; insoluble in water, alcohol.
Uses: Medicine (nose and throat affections, unofficial).
Railroad shipping regulations: None.*

Salvarsan. See Arsphenamine.

Salvia (Sage; Garden sage).
Dried leaves of perennial shrub, Salvia officinalis.
Habitat: Southern Europe; cultivated in United States, England, France and Italy.
Grades: Technical.
Containers: Bags.
Uses: Condiment.
Railroad shipping regulations: None.*

Salvia Oil. See Sage oil.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Salysal. See Salicylic acid, salicylic ester.

Samaria. See Samarium oxide.

Samarium Sa.
Color and properties: Whitish-gray (also reported yellow) metal, tarnishing in the air.
Constants: Sp.gr. (about) 7.7 to 7.8; m.p. 1,300° to 1,400°C.

Samarium Carbide SaC_2.
Color and properties: Yellowish crystalline mass. Decomposed by water with evolution of hydrogen, acetylene, olefines, and paraffins.
Constants: Sp.gr. 5.86.
Railroad shipping regulations: None.*

Samarium Chlorohydrate $SaCl_3 . 6H_2O$.
Color and properties: Yellow plates.
Constants: Sp.gr. 2.382.
Railroad shipping regulations: None.*

Samarium Dichloride $SaCl_2$.
Color and properties: Dark reddish-brown crystalline mass.
Constants: Sp.gr. 3.687 (22°C.).
Insoluble in alcohol; decomposed by water yielding samaria, samarium oxychloride and hydrogen.
Derivation: By reducing the anhydrous chloride at high temperature with hydrogen, ammonia or aluminum powder.
Railroad shipping regulations: None.*

Samarium Oxide (Samaria) Sa_2O_3.
Color and properties: White with yellowish tinge.
Constants: Sp.gr. 8.347.
Railroad shipping regulations: None.*

Samarium Sulfate $Sa_2(SO_4)_3 . 8H_2O$.
Color and properties: Light yellow crystals.
Constants: Sp.gr. 2.930 (18°C.).
Railroad shipping regulations: None.*

Samarium Sulfide Sa_2S_3.
Color and properties: Yellow mass.
Constants: Sp.gr. 3.7.
Derivation: By passing sulfur vapor or hydrogen sulfide over the carbide at high temperature.
Railroad shipping regulations: None.*

Samarium Trichloride $SaCl_3$.
Color and properties: Yellowish-white powder.
Constants: Sp.gr. 4.465 (18°C.); m.p. 686°C.
Soluble in alcohol, pyridine, water.
Railroad shipping regulations: None.*

Samarskite (Nohlite; Vietinghofite; Yetteroilmenite).
One of the rare earth minerals. The Carolina variety contains: 14.36% tantalum oxide, 41.07% columbium oxide, 0.16% oxides of tin and tungsten, 10.90% uranium oxide, 2.37% ceria, 6.10% yttria, 10.80% erbia, 14.61% iron oxide, 0.56% titanium oxide. Color, velvet-black; streak, dark reddish-brown; luster, vitreous to resinous, splendent.
Constants: Sp.gr. 5.6 to 5.8; hardness 5 to 6.
Occurrence: United States (North Carolina, Connecticut), Canada, Russia, Australia, India, Madagascar.

Sambucus (Elder).
Color and properties: Brownish-yellow petals.
Chief constituents: A volatile oil, a resin and tannin.
Derivation: The flowers of Sambucus canadensis.
Grades: Technical.
Containers: Boxes.
Uses: Medicine (of doubtful value).
Railroad shipping regulations: None.*

Samol. See Menthyl salicylate.

Sanatol. See Creolin.

Sand Acid. See Hydrofluosilicic acid.

Sand Cement. See under Cements, structural.

Sand, Glass. A sand of medium grain consisting of 98 to 100% of silica (SiO_2) and never containing as much as 1% of iron oxides. Found in many parts of the country.

Sand, Molding. A sand used for making the molds for casting metal.

Sand, Placing.
A sand used in the pottery industry for the placing of bisque ware. It must be free of iron and fluxes so that it will not flux with the body it comes in contact with.

Sand Sedge. See Carex.

Sand-star. See Carex.

Sandal Oil. See Santalwood oil.

Sandalwood Oil. See Santalwood oil.

Sandalwood, Red. See Santalum rubrum.

Sandarac Gum (Juniper gum).
Color and properties: Yellow, brittle, translucent, amorphous lumps or powder.
Soluble in alcohol, ether, amyl alcohol and hot caustic alkali; partially soluble in volatile oils, carbon bisulfide, choroform and oil of turpentine; insoluble in benzine, benzene and water.
Derivation: The resin from Callitris quadrivalvis, indigenous in Morocco.
Grades: Technical.
Containers: Bags.
Uses: Incense; varnishes, lacquers, dental cements.
Railroad shipping regulations: None.*

Sandbergite.
Similar mineral to tennantite (q.v.) but contains 7% zinc.

Sandstone.
Essentially grains of quartz with some feldspar, mica or other minerals. The cohesion of the grains may be caused by pressure or by a binder according to which it may be classified as siliceous, ferruginous, calcareous, or argillaceous.
Uses: Building stone.

Sandstone, Asphaltic. A loose-textured sandstone, containing asphalt.

Sandstone, Bituminous. See Sandstone, asphaltic.

Sangrel. See Serpentaria.

Sanguinaria (Bloodroot; Blood geranium; Red puccoon; Red-root; Tetterwort).
Derivation: Dried rhizome and roots of Sanguinaria canadensis.
Habitat: North America.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (as an active local irritant).
Railroad shipping regulations: None.*

Sanidine.
A monoclinic variety of feldspar. It is also known as glassy feldspar.

Sanoform (Diïodomethylsalicylate)
$C_6H_2(COOCH_3)(OH)I_2$.
Color and properties: Colorless, crystalline powder; odorless; tasteless. Contains 62.7% iodine. Less toxic than iodoform. Stable in light and air.
Constants: M.p. 110°C.
Soluble in ether, chloroform, benzene, carbon bisulfide, hot alcohol, less so in cold alcohol; almost insoluble in water, glycerol.
Derivation: Action of iodine on methyl salicylate.
Uses: Medicine (antiseptic dusting powder, gauze, ointment, unofficial).
Railroad shipping regulations: None.*

Sanse. Similar to margine (q.v.).

Sanse Oil.
Oil obtained by extraction with carbon bisulfide from sanse (q.v.).

Santal Oil. See Santalwood oil.

Santalum Album (Sandalwood).
Heartwood of Santalum album.
Habitat: India, Malay.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: N.F.
Uses: Source of santalwood oil.

Santalum Rubrum (Red saunders; Ruby wood; Red sandalwood).
Heartwood of tree Petrocarpus santalinus.
Habitat: East Indies.
Uses: Coloring extract.
Railroad shipping regulations: None.*

Santalwood Oil (Sandalwood oil; Santal oil; East Indies sandalwood oil).
Color and properties: Somewhat viscous essential oil; pale yellowish to yellow; faint, aromatic, persistent odor; harsh, resinous taste, somewhat pleasant.
Chief known constituents: Santalene and santalol and esters of the latter, and santenone.
Constants: Sp.gr. 0.974 to 0.985 at 15°C.; optical rotation −16° to −20° 45′; refractive index 1.504 to 1.508; acid value 0.5 to 8.0; ester value 3 to 17, after acetylation, not less than 196.
Solubility in alcohol: In 3 to 5 vols. of 70% alcohol; in 5 to 6 vols. of 69% alcohol; in 6 to 7 vols. of 68% alcohol.
Derivation: By the steam distillation of the wood of Santalum album of India.
Adulteration: Cedarwood oil; copaiba and gurjun balsam oils; castor oil; sesamé oil; liquid paraffin; linseed oil.
Containers: 24 oz. bottles; 25, 40 lb. tins; 80 lb. cases.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Santalwood Oil, East Indies. See Santalwood oil.

Santalwood Oil, West Australian.
Obtained by distillation of wood of Fusanus spicatus in West Australia. Differs slightly from Indian santalwood oil and is cheaper.

Santalwood Oil, West Indies.
Color and properties: Viscous essential oil. Odor: Faint, somewhat unpleasant.
Chief known constituents: Amyrol; amyrolin; cadinene; caryophyllene; etc.
Constants: Sp.gr. 0.950 to 0.970 at 15°C.; optical rotation +19° to +29°; refractive index 1.508 to 1.513; acid value up to 3.0; ester value up to 6.0, after acetylation, 66 to 125.
Solubility in alcohol: In 1 vol. or less of 90% alcohol; in 2 to 10 vols. of 80% alcohol (occasionally).
Derivation: By steam distillation of the wood of Amyris balsamifera, L.
Containers: 24 oz. bottles; 25, 40 lb. tins; 80 lb. cases.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Santonica (Levant worm-seed; Semen cinaeina; Wormseed).
Derivation: Dried, unexpanded flower heads of Artesmisia pauciflora.
Habitat: Persia; Turkestan and Russia.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Santonin $C_{15}H_{18}O_3$.
Color and properties: Glossy, colorless crystals or white powder, turning yellow on exposure to light; odorless; tasteless at first, then bitter; poisonous!
Constants: Sp.gr. 1.866; m.p. 169° to 170°C.; b.p.: Sublimes.
Soluble in chloroform, alcohol, alkalis and most volatile and fatty oils; very slightly soluble in water.
Derivation: By extraction from Santonica artemisia.
Grades: Technical; U.S.P.
Containers: 1 oz., ¼, 1 lb. bottles; ¼, 1, 5 lb. cans.
Uses: Medicine (vermifuge).
Railroad shipping regulations: None.*

Santorin Earth.
A fine, light gray-colored volcanic ash found in the Island of Santorin in the Grecian Archipelago. It is like pozzolana and trass but has a higher silica content. It also contains some pumice, quartz and feldspar. Used in the manufacture of pozzolana cements (q.v.).

Saponaria (Soapwort).
Rhizome and roots of perennial herb, Saponaria officinalis.
Habitat: United States, Europe.
Uses: Source of saponin which constitutes about one-third of the root.

Saponin $C_{32}H_{52}O_{17}$.
Color and properties: White, amorphous, glucoside; pungent, disagreeable taste and odor; poisonous! It foams very strongly when shaken with water.
Chief constituents: Sapotoxin, lactosin and quillajic acid.
Soluble in water.
Derivation: By extraction from the root of saponaria officinalis, bark of quillaja root or Indian chestnut.
Grades: Crude, purified; highest purity.
Containers: 1, 5 lb. bottles; 1, 5, 10 lb. cans; 25, 50 lb. boxes; 100 lb. kegs.
Uses: Foam producer in beverages; detergent in the textile industries; sizing; substitute for soap; fire extinguishers; emulsification agent for fats and oils; dentifrices.
Railroad shipping regulations: None.*

Sappan Wood.
Heartwood of the tree, Caesalpinia sappan.
Habitat: China, Japan and India (Singapore or Shansari and Ceylon).
Grades: Technical.
Containers: Bags.
Uses: Textile dyeing as a substitute for logwood; medicine (astringent in diarrhea).
Railroad shipping regulations: None.*

Sapphire. See Corundum.

Sard.
A variety of carnelian (q.v.).
Color: Yellow, brown, deep red.
Uses: Gem stone.

Sardine Oil.
Color and properties: Pale golden-yellow liquid.
Constants: Sp.gr. 0.9274 to 0.9330; m.p. 28° to 36°C; acid value 4 to 25; Hehner value 95 to 97; saponification value 189 to 193; iodine value 181 to 193; refractive index 1.4802 to 1.4808.
Soluble in alcohol, ether, chloroform, benzine and carbon bisulfide.
Derivation: By chopping up sardines and subjecting them to boiling and pressing.
Grades: Crude; refined.
Containers: Wooden barrels.
Uses: Soap; leather stuffing; lubricant.
Railroad shipping regulations: None.*

Sardonyx.
A form of onyx (q.v.). Essentially alternate layers of reddish sard (q.v.) or carnelian (q.v.) and chalcedony (the light colors).

Sarsaparilla
The dried root of Smilax officinalis and other Smilax.
Habitat: Southern United States, Honduras, Jamaica, Mexico, Guatemala and Brazil.
Grades: U.S.P.
Containers: Honduras, 160 lb. bales; Mexican, 200 lb. bales; bags and bales of variable size.
Uses: Medicine (mild gastric irritant); soft drinks.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Sassa Gum.
Color and properties: Reddish mammillary masses or convoluted pieces. Taste acrid, but similar to that of tragacanth gum. More transparent than tragacanth. In water it turns white, softens and swells to four or five times its original size, but retains its shape.
Derivation: From Albizzia fastigiata Oliv. found in Abyssinia.
Railroad shipping regulations: None.*

Sassafras Bark (Saxifrax; Ague tree; Cinnamon wood; Saloop).
The dried bark of root of Sassafras variifolium.
Habitat: North America.
Grades: Technical; N.F.
Containers: 150 lb. bales; bags and bales of variable size.
Uses: Medicine (for its oil content); flavoring; perfumery.
Railroad shipping regulations: None.*

Sassafras Oil.
Color and properties: Yellowish or reddish-yellow, volatile liquid oil; pungent, aromatic odor and warm, aromatic taste.
Chief constituents: Safrole, eugenol, camphor, pinene, phellandrene.
Constants: Sp.gr. 1.065 to 1.095; optical rotation +1° to +4°.
Soluble in alcohol, ether, chloroform, glacial acetic acid and carbon bisulfide.
Derivation: Distillation of the bark of Sassafras officinalis.
Method of purification: Rectification.
Impurities: Terpenes.
Grades: Technical.
Containers: Glass bottles; cans; iron drums.
Uses: Flavoring; perfumery; medicine.
Railroad shipping regulations: None.*

Sassafras Oil, Terpeneless.
Concentration: About 1.5 times that of the ordinary sassafras oil.
Constants: Sp.gr. (about) 1.088 to 1.09; optical rotation +1° to +2°.
Solubility in alcohol: 4 vols. in 100 vols. of 70% alcohol; 15 vols. in 100 vols. of 80% alcohol.
Railroad shipping regulations: None.*

Sassafras Pith.
The dried mucilaginous pith of Sassafras variifolium.
Habitat: North America.
Grades: N.F.
Containers: Bags.
Uses: Medicine (for its mucilage).
Railroad shipping regulations: None.*

Sassolite H_3BO_3.
A natural boric acid found as small pearly yellowish-white scale on native sulfur in the crater of Vulcano (Lipari Isles) and as a sublimation around Vesuvian fumaroles. Also forms a small proportion of the boron compounds in Californian borax localities. Was formerly collected commercially at Vulcano. 2,000 to 3,000 tons annually are now collected in Tuscany by condensation and evaporation of steam from fumaroles. See Boric acid.

Satin Spar. See Gypsum.

Saturating Compounds.
Compounds used for saturating weather-proof wire and generally consisting of a mixture of petroleum pitch and wax tailings or pine tar.
Constants of typical compound: M.p. 160°F.; sp.gr. 1.0269 (60°F.); viscosity 2.45 to 3.82 (300° to 350°F.); penetration 30 to 160 (70° to 120°F.).
Railroad shipping regulations: None.*
See Waxes, saturating; Waxes, finishing; Waxes, combination.

Satureja (Summer savory).
Derivation: The herb of the summer savory, Satureja hortensis.
Habitat: United States and Europe.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Savin (Sabina).
Derivation: Tops of evergreen shrub Juniperus sabina.
Habitat: Europe, northern Asia, North America south to New York and Montana.
Grades: Technical.
Containers: Bags.
Uses: Medicine; savin oil.
Railroad shipping regulations: None.*

Savin Oil.
Color and properties: Colorless to pale yellow liquid.
Chief known constituents: Sabinol; cadinene; pinene.
Constants: Sp.gr. 0.910 to 0.930; optical rotation +40° to +60°.
Soluble in alcohol, ether and chloroform.
Derivation: Distilled from the fresh leaves and twigs of Juniperus sabina.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 5 lb. bottles; 11, 25 lb. tins.
Uses: Medicine (local irritant).
Railroad shipping regulations: None.*

Savory, Summer. See Satureja.

Saw Palmetto Berries. See Sabal.

Saw Palmetto Oil. See Sabal oil.

Saxifrax. See Sassafras.

Saxin. See Saccharin.

Saxoline. See Petrolatum.

Saxon Blue. See Iron blues.

Scammony Resin (Resin of Ipomea).
A mixture of resins obtained by extraction from scammony root.
Soluble in alcohol.
Uses: Medicine (energetic cathartic).
Note: Due to its scarcity Jalap resin is usually used as a substitute.

Scammony Root.
Root of Convolvulus scammonia.
Habitat: Asia Minor and Greece.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Source of scammony resin.
Railroad shipping regulations: None.*

Scandia. See Scandium oxide.

Scandium.
One of the rare earth (q.v.) metals.

Scandium Borate $ScBO_3$.
Color and properties: White powder.
Soluble in dilute acid.
Derivation: By fusing scandia and boric acid.
Railroad shipping regulations: None.*

Scandium Oxide (Scandia) Sc_2O_3.
Color and properties: White powder resembling magnesia.
Constants: Sp.gr. 3.864; specific heat 0.153 (0° to 100°C.).
Soluble in hot acids, less so in cold acids.
Derivation: By ignition of the hydroxide.
Railroad shipping regulations: None.*

Scandium Sulfide Sc_2S_3.
Color and properties: Light yellow powder decomposed by boiling water and by dilute acids with evolution of hydrogen sulfide.
Derivation: By heating the sulfate in hydrogen sulfide.
Railroad shipping regulations: None.*

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Scarlet Corns. See Kermes.

Schaeffer's Acid. See 2-Naphthol-6-sulfonic acid.

Schaeffer's Salt. Sodium salt of 2-Naphthol-6-sulfonic acid (q.v.).

Schaffer's Salt. See Schaeffer's salt.

Schaumopal. See Opal.

Scheele's Green. See Copper arsenite.

Scheelite $CaWO_4$, often with replacement by molybdenum. Pale yellow, gray, brownish-white, white or green mineral with white streak and vitreous to adamantine luster. Found in veins in or near granite and in veins with silver, gold, etc. Contains 80.6% WO_3 or 63.9% W. Decomposed by hydrochloric and nitric acids leaving a yellow powder soluble in ammonia. See also Cuproscheelite, Powellite.

Constants: Sp.gr. 5.4 to 6.1; hardness 4.5 to 5.

Occurrence: United States (Connecticut, North Carolina, Nevada, Idaho, Colorado, California, Arizona), Bohemia, Germany, Austria, England, Italy, France, Sweden, Finland, Australia, New Zealand, Tasmania, Mexico.

Uses: Source of tungsten, but not so important as wolframite.

Schefferite $(CaMg)(FeMn)(SiO_3)_2$.

A complex natural silicate containing considerable iron and up to 8% MnO. Color, ranges from brown to black.

Occurrence: Sweden.

Scheibler's Reagent.

A reagent used in analytical work as a test for alkaloids. It is prepared by dissolving 100 grams sodium tungstate and 70 grams sodium phosphate in 500 cc. water and acidifying with nitric acid.

Schiff's Reagents.

Three reagents used in analytical work as follows:

As a test for aldehydes: A solution of rosaniline hydrochloride decolorized by sulfur dioxide.

As a test for urea: Furfural and hydrochloric acid.

As a test for cholesterin: Concentrated sulfuric acid followed by ammonia.

Schlippe's Salt. See Livers of antimony.

Schnitzer's Green.

Color and properties: A green pigment of good durability.

Derivation: By melting 36 parts sodium phosphate in its water of crystallization, and then adding 15 parts potassium bichromate and 14 parts Rochelle salt. After cooling, as much hydrochloric acid as the mass will absorb is added and the product allowed to stand and then washed first with cold and then with hot water.

Schoelkopf's Acid. See 1-Naphthylamine-4:8-disulfonic acid and 1-Naphthylamine-8-sulfonic acid.

Schorlomite $Ca_3(FeTi)_2(SiTi)_4O_{12}$.

Resembles garnet (q.v.). Color, black.

Schwartzite (Mercurial tetrahedrite).

A variety of fahlore (q.v.). Color, dark gray to iron-black. Luster, often dull. Contains 15.57% mercury, 34.57% copper, 21.35% antimony, 22.96% sulfur.

Constants: Sp.gr. 5.10.

Occurrence: Austria.

Schweinfurth Green. See Copper acetoarsenite.

Schweitzer's Reagent.

A reagent used in analytical chemistry as a solvent for cellulose. It consists of a solution of copper hydrate in strong ammonia.

Scilla, U.S.P. See Squill.

Scoparius (Broom; Green broom; Scotch broom; Irish broom; Hogweed; Bannal).

Dried tops of shrub Cytisus scoparius.

Habitat: Western Asia, southern and western Europe; cultivated in the United States.

Grades: Technical; N.F.

Containers: Bags.

Uses: Medicine (diuretic and cathartic); perfumery.

Railroad shipping regulations: None.*

Scopola (Japanese belladonna).

Derivation: Dried rhizome of Scopola carniolica.

Habitat: Japan, Germany, Austria, Hungary and Russia.

Grades: Technical; U.S.P.

Containers: Bags.

Uses: Medicine.

Railroad shipping regulations: None.*

Scopolamine Hydrobromide. See Hyoscine hydrobromide.

Scopoline (Oscine) $C_8H_{13}O_2N$.

A base obtained by hydrolysis of scopolamine with dilute alkali.

Scorodite. Natural ferrous arsenate, $Fe_2O_3.As_2O_5.4H_2O$, from Utah and Washington.

Scotch Broom. See Scoparius.

Scotch Glue. See Glue and gelatin.

Scott's Cement. See under Cements, structural, Selenitic cement.

Scrap, Wet Acid. See Fish scrap, wet.

Screw-cutting Oils.

Plain engine oil is satisfactory for cutting screws, bolts and nuts.

Scutellaria (Skullcap; Helmet flower).

Dried plant of Scutellaria lateriflora.

Habitat: Canada south to Florida and New Mexico.

Grades: N.F.

Containers: Bags.

Uses: Medicine (of doubtful value).

Railroad shipping regulations: None.*

Scythestone. A whetstone suitable for sharpening scythes.

Sea Moss. See Irish moss.

Sea Onion. See Squill.

Sea Parsley. See Lovage.

Sea Salt. See Sodium chloride.

Sea Weed. See Kelp.

Seal Oil.

Color and properties: White or pale yellow to red-brown liquid.

Constants: Sp.gr. 0.9240 to 0.9263; m.p. 22° to 33°C.; acid value 1.9 to 40; solidifying point —2 to —3; Hehner value 93 to 96; saponification value 189 to 196; iodine value 127 to 159; refractive index 1.4741.

Soluble in ether, chloroform, benzine and carbon bisulfide.

Derivation: The membranes of brain and back of seals are allowed to melt and putrefy in the sun, then extracted by boiling with water.

Grades: "Water-white"; "straw seal"; "yellow seal"; "brown seal."

Containers: Wooden barrels.

Uses: Soap manufacture.

Railroad shipping regulations: None.*

Seal Oil, Mineral.

Name given to a mineral burning oil. See Burning oils, mineral.

Secale Cornutum. See Ergot.

Secondary Butylcarbinol. See Amyl alcohol, active.

Secondary Calcium Phosphate. See Calcium phosphate, dibasic.

Securite. See under Explosives, Sekurite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Sedatin. See Isovaleryl-para-phenetidine.

Sedatine. See Antipyrine.

Seed Oil. See Cottonseed oil.

Seidlitz Powders.
In the blue paper: 3 parts rochelle salt with 1 part sodium bicarbonate.
In the white paper: Tartaric acid.
Railroad shipping regulations: None.*

Seignette Salt. See Potassium-sodium tartrate.

Seladon Green. See Earths, green.

Selenious Acid. See Selenous acid.

Selenite. Single crystals of gypsum (q.v.).

Selenium Se_8.
Color and properties: Steel-gray, non-metallic rods or buttons; very high luster; crystalline surface on being broken. Also occurs in the form of dark red crystals or powder, soluble in carbon bisulfide and melting between 170° and 180°C. Selenium burns in air with a bluish-red flame, forming selenium dioxide.
Constants: Sp.gr. 4.26 to 4.28; m.p. 217°C.; b.p. 600°C.
Soluble in concentrated sulfuric acid; insoluble in water and alcohol.
Derivation: Occurs in nature in copper ores from which it is removed during the electrolytic refining of copper in the mud which settles in the cells. It is obtained by extraction with alkali cyanides and precipitation with hydrochloric acid, followed by oxidation with nitric acid and evaporation, selenium dioxide remaining.
Method of purification: By sublimation and reduction by means of an aqueous solution of sulfur dioxide.
Grades: Technical.
Containers: Glass bottles.
Uses: Photometry; electrical experimental work; glass and rubber manufacture; bacteriology; photography of sound and its reproduction; wireless telephony; biological chemistry. The allotropic, red powder form is used in microscopy as an imbedding material.
Railroad shipping regulations: None.*

Selenitic Cement. See under Cements, structural.

Selenous Acid (Selenious acid) H_2SeO_3.
Color and properties: Transparent, colorless crystals.
Constants: Sp.gr. 3.0066; m.p.: Decomposes.
Soluble in water and alcohol.
Derivation: By the action of hot nitric acid on selenium.
Method of purification: Sublimation.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical reagent.
Railroad shipping regulations: None.*

Semecarpus (Oriental cashew-nut; Malacca nut; Marany nut; Marking nut; Acajou-nut; Mangle).
Derivation: The fruit of Semecarpus anacardium.
Grades: Technical.
Containers: Bags.
Uses: Medicine; manufacturing indelible inks; coloring fats and oils black; making the so-called "Silhet's varnish or lacquer" for iron and stone vessels; cashew oil.
Railroad shipping regulations: None.*

Semen Cinae. See Santonica.

Semen Erucae. See Sinapis alba.

Semi-bituminous Coal.
The classification "Semi-bituminous" is misleading as it implies this coal is inferior in rank to bituminous, whereas it is of much higher rank. It is high in fixed carbon, low in volatile matter, and is sold as a smokeless coal. Its heating value is extremely high, being greater, in the best grades, than that of any other rank. This coal is well adapted to almost any steam generating plant, is used extensively in the pottery industry and other processes where a high degree of heat is necessary. It is mined over a wide area in central Pennsylvania, West Virginia, and Maryland and supplies a large percentage of the utility and manufacturing plants throughout the eastern states. It is also considered as the highest grade of steamship bunker coal. The well known "Navy Standard" coal is included in this group.

Semi-opal. See Opal.

Semi-water Gas.
A gas obtained by blowing air and steam together over a bed of incandescent fuel.

Senarmontite (Octahedral antimony trioxide) Sb_2O_3.
Colorless or gray mineral with white streak and resinous, almost adamantine luster. Contains 83.3% antimony. See Valentinite.
Constants: Sp.gr. 5.22 to 5.30; hardness 2 to 2.5.
Occurrence: Algiers, Servia, Italy, Germany.

Seneca Oil.
A term sometimes applied to petroleum in colonial days, when it was used in medicine.

Seneca Root. See Senega.

Senecio (Life root; Ragwort).
Dried plant of Senecio aureus.
Habitat: Central United States.
Grades: N.F.
Uses: Medicine (of doubtful value).

Senega (Senega snakeroot; Seneca root; Rattlesnake root).
Dried root of Polygala senega.
Habitat: North America (Canada to South Carolina, west to Wisconsin).
Grades: Technical; U.S.P.
Containers: 200 lb. bags; bags of variable size.
Uses: Medicine (expectorant).
Railroad shipping regulations: None.*

Senega Snakeroot. See Senega.

Senegal Gum. See Arabic gum.

Sennaar Gum. See Arabic gum.

Senna.
Dried leaflets of Cassia senna or other Cassia.
Habitat: Nubia, Barbary, Abyssinia, Egypt and southern India.
Grades: Technical; U.S.P.
Containers: Alexandria: whole and half leaf, 200 lb. cases; siftings, 300 lb. bales; powder, 300 lb. barrels; Tinnevelly: 350 lb. bales; bales of variable size; powder, 200 lb. barrels.
Uses: Medicine (cathartic).
Railroad shipping regulations: None.*

Sennatin.
A preparation containing the active principles of senna. Used in medicine, subcutaneously, as a cathartic. Unofficial.

Sennax.
A preparation containing the water-soluble glucosides of senna used in medicine as a cathartic. Unofficial.

Sepia (Os sepiae).
Derivation: A calcareous substance found under the skin of the back of the cuttle-fish (Sepia officinalis).
Grades: Trieste, French, jewelers.
Containers: 75 lb. straps; 5, 25, 50 lb. boxes.
Uses: Polishing agent; tooth powders; jewelry models.

Sepia. A reddish-brown pigment prepared from the ink of the cuttlefish. It is a mixture of calcium carbonate, magnesium carbonate, melanin, and an organic black coloring matter.

Sepiolite. See Meerschaum.

Sericose. See Cellulose acetate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Serpentaria (Virginia snakeroot; Snakeroot; Snake weed; Sangrel; Birthwort).
Dried rhizome and roots of Aristolochia serpentaria or reticulata.
Habitat: United States.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (aromatic bitter).
Railroad shipping regulations: None.*

Serpentine.
A natural hydrated magnesium silicate corresponding to the formula $H_4Mg_3Si_2O_9$, sometimes containing small amounts of Ni and with partial replacement of Mg by ferrous oxide. Color: dark to blackish-green, brownish-red or yellow. White streak; greasy, waxy, subresinous luster.
Constants: Sp.gr. 2.5 to 2.65; hardness 2.5 to 4.
Varieties:
Precious (Noble): Pale or dark shades of oil green.
Retinalite: Yellow to light oil green.
Bowenite: Greenish white or light green.
Ricolite: Green and banded.
Antigorite: Brown green (by reflected light).
Marmolite: Grades from green or bluish-white to pale green.
Picrolite: Dark green, gray, brown.
Chrysotile: Fibrous variety. See Asbestos.
Serpentine often occurs intermixed with dolomite, magnesite, or calcite forming opaque greenish-colored rocks often with green or white veins. These are known as ophiolite, ophicalcite, or verde antique. They are sometimes commercially considered as marbles and are used for decorative purposes.
Occurrence: United States (Maine, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, California, Arizona), Austria, Russia, Norway, Sweden, Scotland, England, Germany, Siberia.

Serpentine Asbestos. See Asbestos.

Sesamé Oil (Benne oil; Beni oil; Teal oil; Teel oil; Til oil; Gingelly oil; Gingily oil; Gingili oil; Gigily oil).
Color and properties: A fixed, bland, yellow, liquid oil. Does not readily become rancid.
Chief known constituents: Olein (75%), stearin, palmitin, pyristin, linolein and sesamin.
Constants: Sp.gr. 0.9210 to 0.9244; solidifying-point −5°C.; m.p. 26° to 32°C.; acid value 0.2 to 46; Hehner value 95.7; saponification value 188 to 193; iodine value 103 to 114; refractive index 1.4748 to 1.4762.
Soluble in chloroform, carbon bisulfide, ether, benzine; slightly soluble in alcohol.
Derivation: By pressing from Sesamé orientale grown in China, Japan, East Indies and South America.
Method of purification: Filtration.
Grades: Edible, should contain less than 1% free fatty acids; semi-refined; coast.
Containers: Tins; 375, 500 lb. wooden barrels.
Uses: Manufacture of oleomargarine, soap, cosmetics, etc.; general use similar to olive and almond oils which are frequently adulterated with sesamé oil; production of iodipin.
Railroad shipping regulations: None.*

Sesamé Oil, Iodized. See Iodipin.

Seven Barks. See Hydrangea.

Seville Orange. See Orange peel, bitter.

Sewage Pitch. See Stearin and fatty acid pitches.

Sewer Pipe Clay. See under Clays.

Seybertite $H_3(MgCa)_5Al_5Si_2O_{18}$ or $3H_2O.10(MgCa)O.5Al_2O_3.4SiO_2$.
One of a group of silicate minerals known as "brittle micas" (q.v.) which may be classed as transition products from the micas to the chlorite minerals.
Varieties:
Clintonite: Reddish-brown to copper-red.
Occurrence: United States (New York).
Brindisite: Yellowish-green, reddish-gray.
Occurrence: Austria.

Shale. A fine-grained rock formed by the consolidation of silt or clay, having a slate-like cleavage. When carrying petroleum in the interstices it is called oil-bearing shale, when carrying bituminous matter which yields oils and tarry substances when destructively distilled it is called oil-shale. Oil-shale occurs in quantity in Scotland where it has been worked for a number of years as a source of oil, gas and tar. It is also found in Kentucky, Colorado, Utah, Nevada, Montana, California, Wyoming and Canada in workable quantities. See table below for analysis.

Shale Oil.
A crude oil obtained from bituminous shale (q.v.). Color: Dark green to brown. Sp.gr. 0.86 to 0.96.

Shark Oil (Dog-fish oil).
Color and properties: Yellow to red-brown liquid; characteristic odor, not disagreeable if the oil is refined.
Constants: Sp.gr. 0.9179; saponification value 170; iodine value 126.
Soluble in ether, chloroform, benzine and carbon bisulfide.
Derivation: By expression from the livers of the dog-fish, Squalus acanthius.
Method of purification: Filtration.
Grades: Crude; refined.
Containers: Wooden barrels.
Uses: Paints; currying leather; soaps; waterproofing.
Railroad shipping regulations: None.*

Shark-liver Oil.
Color and properties: Yellowish-brown-red liquid.
Constants: Sp.gr. 0.9286; refractive index 1.4743; iodine number: 155.
Soluble in chloroform, ether, carbon bisulfide and benzene.
Derivation: Obtained from the livers of the shark, Hypoprian brevirostris by the same process employed in the cod-liver oil industry.

ANALYSIS OF SOME AMERICAN OIL SHALES:

Source of Shale	Ash Analysis SiO_2	Fe_2O_3 and Al_2O_3	CaO	MgO	Volatile matter and fixed carbon	Oil Yield gals. per ton
		Per Cent				
De Beque, Colo.	44.70	25.60	17.65	5.28	40.0	42.7
Elko, Nev.	65.5	25.5	0.6	0.8	33.5	32.5
Dragon, Utah	45.8	16.4	23.9	7.9	42.2	41.6
Dragon, Utah	46.8	17.5	23.9	8.9	34.3	21.7
Green River, Wyo.	38.9	12.4	38.3	4.9	34.9	23.4
Green River, Wyo.	41.9	18.8	17.6	10.9	48.1	58.7
Kentucky	52.0	19.1	12.5	8.2	29.3	18.2
Ione, Cal.	43.0	38.1	8.7	2.5	62.9	52.0
Casmalia, Cal.	75.8	19.1	1.4	0.9	—.	18.0

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Filtration.
Grades: Yellow strained; red; yellow; yellow-red; Japanese; crude; refined.
Containers: Wooden barrels.
Uses: Leather dressing; oil tannage; varnishes; paints.
Railroad shipping regulations: None.*

Sharps.
A term used in flour-milling. It is synonymous with middlings (q.v.).

Sheep Berry. See Viburnum prunifolium.

Shellac (Lac, Mecca; Garnet lac; Gum lac; Stick lac).
Derivation: A resin produced by the bite or sting of a certain insect (Coccus lacca), appearing as a thick excrescence on the small twigs of several species of East Indian trees. It is collected and in this form is known as "stick lac." The crude lac is macerated in order to extract a brilliant red dye known as lac dye. The seed lac is refined by melting and straining and is then poured in thin films over cylinders or plates and allowed to cool. When it hardens and scales off in thin flakes, it is known as shellac, or it is poured into molds to form "button" or garnet lac. This is the orange shellac of commerce. White shellac is made by bleaching orange shellac with sodium hypochlorite.
Grades: D. C.; V. S. O.; Diamond 1; Superfine orange; Fine orange; Medium orange; T. N.; A. C. garnet; Button; Bleached, ground; Bleached, bone-dry.
Containers: D. C. 190 lb. cases, 164 lb. bags; second orange, T. N., ground regular, 164 lb. bags; regular bleached, bone dry, 250, 300 lb. barrels.
Uses: Varnishes; leather dressing; polishes; millinery (stiffening); phonograph records; dielectric compositions; general binder; engraving and lithography; sealing wax; inks; rubber; match heads; paper.
Railroad shipping regulations: None.*

Sherardizing. A method of zinc coating iron developed by Sherard Cowper-Cowles.

According to Rawdon ("Protective Metallic Coatings," New York, Chemical Catalog Company, Inc., 1928), "the articles to be coated, after cleaning, which as a rule need not be so drastic as for some other coating methods, are packed in zinc dust in a metal drum which may serve also as the shell of the furnace if the heating is to be carried out electrically. The container must be reasonably air-tight and be fitted with a tightly fitting cover. The container together with its contents is heated either electrically by heating coils in its walls or by gas, and is slowly rotated during the heating. Care is taken that the zinc-dust packing does not completely fill the container, so that as the drum is rotated a slight 'rumbling' between the zinc dust and the articles to be coated occurs and intimate contact between the two results. The feature of operation is important as the uniformity of the coating produced depends to a very large extent upon it. The character of the zinc dust used, particularly its iron content, and the temperature and period of heating, also have an important effect upon the coating produced. Fine zinc powder absorbs moisture rather readily, and on heating, hydrogen is evolved but the evolution of hydrogen by the heated powder is an advantage rather than otherwise as it reduces the chances for oxidation.

"Commercial 'blue dust,' a by-product in the usual method for smelting zinc, is the material used generally, although a special form of zinc powdered to 100-mesh fineness is used to some extent in combination with the blue dust. The blue dust contains approximately 85 to 90% metallic zinc, with 5 to 8% of zinc oxide. A zinc-iron alloy of the approximate composition, $FeZn_{10}$, somewhat of the nature of the dross formed in the hot-dipping process, is also used to a limited extent. In some of the earlier descriptions of the process the dilution of the zinc dust by some inert material, such as sand, has been emphasized. The principal reason for an addition of this kind is to prevent caking of the extremely fine dust. The practice of some of the most successful users of this process has not favored the dilution of the zinc dust but rather the addition at intervals of a small amount of new dust to the used dust. The use of 10% new dust and 90% used material, carefully freed from iron and oxide particles, has been found to give excellent results. Such a mixture of used and new dust would have a metallic zinc content of 80 to 92%.

"The temperature at which the cementation process is carried out has a marked effect upon the rate of coating-formation. A characteristic property of the fine zinc dust used is that it does not melt readily when heated somewhat above the melting point of zinc. Each microscopic particle of zinc undoubtedly does melt, but the particles do not coalesce to form a melt of any appreciable size. This is usually attributed to the influence of a pellicle of oxide surrounding each dust particle. It is possible, therefore, for the cementation process to be carried on at a temperature considerably above 419°C., the melting point of zinc. The appearance and properties of the coating vary with the temperature used. For most purposes a rather low temperature is favored, and 350° to 375°C. has been recommended as very desirable. Zinc cementation above the melting point of zinc has been characterized as a special modification of the hot-dipping process and it is probably true that when the temperature exceeds 419°C., in addition to the process which takes place below 419°C., particles of zinc become attached bodily to the surface of the article and aid in that way in building up the coating.

"The temperature used also affects the iron content of the coating. A sherardized coating produced at relatively high temperatures has a considerably higher iron content than does one made at a lower temperature, other conditions of operation remaining the same. The temperature to be used also depends somewhat upon the composition of the zinc dust used. With a dust having an iron content of 7%, it is necessary to maintain the temperature at 450°C. (842°F.) in order to deposit a coating at the same rate as is produced from a pure zinc dust at 375°C. (707°F.). This also applies in the case of the zinc-dross powder sometimes used for sherardizing. Presumably this difference in the sherardizing temperature is a result of the somewhat lower vapor pressure of the zinc-iron alloy as compared with that of pure zinc."

Zinc coating cannot be applied so thick by sherardizing as by the hot-dip process (See Galvanized iron), without danger of flaking off. As with other methods, thick coatings are not suitable when the material has to stand bending. The thickness varies from 0.008 inch to a minimum of 0.0015 inch.

This process is particularly well suited for small articles such as bolts, screws, nuts, small castings and the like. It is used commercially to a considerable extent for electrical conduits, to an extremely limited extent for sheets and not at all for wiring although considerable has been written on the possibility of applying the process, in slightly modified form, to the zinc coating of wire.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Shield Fern. See Aspidium.

Shikimol. See Safrole.

Shiu Oil (Apopino oil).
A Japanese essential oil of high linalool content sold as a substitute for linalool oil. The various samples seen have shown considerable variation in physical properties, probably due to adulteration.
Constants of sample A:
Sp.gr. 0.870 to 0.883; optical rotation —14° to —16°; refractive index, about 1.4606.
Constants of sample B:
Sp.gr. 0.870 to 0.8952 at 15°C.; optical rotation —0°51′ to —15°30′; acid value up to 0.6; ester value 0.5 to 28.
Solubility in alcohol: 1.8 to 10 vols. of 70% alcohol.
Derivation: Distilled from a Japanese tree of unknown classification.
Railroad shipping regulations: None.*

Shorts.
A term used in flour-milling. Shorts are that part of the husk or outer coat of the wheat finer than bran (q.v.). See also Pollards.

Shot Metal. See Lead shot metal.

Shumac. See Sumac.

Sicoid. See Cellon.

Siderite (Spathic iron ore) $FeCO_3$, usually with some Ca, Mg or Mn.
Gray, yellow, brown, green, white or brownish red mineral, vitreous inclining to pearly luster, white streak. Contains 62.1% FeO, 37.9% CO_2. Found in several varieties:
Spathic: Purest natural form of ferrous carbonate. Contains manganese but no phosphorus carbonate.
Clay ironstone: Less pure variety, earthy or stony mixtures with silica, clay, limonite, hematite.
Blackband: Mixtures with clay and carbon.
Spherosiderite: Secondary siderite in basalt cavities.
Constants: Sp.gr. 3.83 to 3.88; hardness 3.5 to 4.
Occurrence: United States (Vermont, Massachusetts, Connecticut, New York, North Carolina, Pennsylvania, Ohio), England, Wales, Germany, Austria, Switzerland, France.
Uses: An ore of iron; when high in manganese, used in the manufacture of spiegeleisen.

Sidero Cement. See under Cements, structural.

Sidonal (Piperazine quinate).
Color and properties: White crystalline powder.
Soluble in water.
Uses: Medicine (diuretic, gout, neurasthenia, unofficial). See also New sidonal.

Siemen's Gas.
A producer gas (q.v.).

Sienna, Burnt.
Orange-brown pigment made by carefully calcining raw sienna (q.v.).

Sienna, Raw.
A brown-tinted ferruginous, manganiferous yellow ocher. Found in the United States (Alabama, California, Pennsylvania), Cyprus, various parts of Italy.
Uses: Pigment.
See also Ocher.

Signal Oil. One recommended signal oil consists of 80% mineral seal oil and 20% white fish oil.
Railroad shipping regulations: None.*

Silberol (Silver phenolsulfonate; Silver sulfophenylate; Silver sulfocarbolate) $C_6H_4(OH)SO_3Ag$.
Color and properties: Crystalline powder. Contains 28% silver. Undergoes spontaneous decomposition but more stable than itrol (q.v.). Has antiseptic properties of silver without its corrosive action.
Soluble in water.
Derivation: By the interaction of silver oxide and phenolsulfonic acids.
Uses: Medicine (astringent, antiseptic, gonorrheal ophthalmia, ocular surgery, unofficial).
Railroad shipping regulations: None.*

Silex. Same as silica (q.v.).

Silica. A white, or colorless, extremely hard, crystalline silicon dioxide found pure as quartz (q.v.).

Silica Gel. A trade name for incompletely dehydrated silicic acid (H_2SiO_4) containing 3 to 7% water.
Color and properties: Hard, transparent glassy substance resistant to most chemical reagents. Powdered or granular in form.
Derivation: Action of an acid such as sulfuric or hydrochloric when mixed simultaneously with sodium silicate under carefully controlled conditions.
Uses: Adsorption from the vapor phase as in drying gas or air; air conditioning; refrigeration; recovery of solvent vapors, gasoline from natural gas, casinghead gas and still gases; adsorption of impurities in liquids as in the refining of gasoline, kerosene, by-product motorbenzene, lubricating oils, transformer oils; catalyst; carrier for catalytic materials.
Railroad shipping regulations: None.*

Silicate Cotton. See Mineral wool.

Siliceous Limestone. See Limestone.

Siliceous Sinter. See Opal.

Silicofluoric Acid. See Hydrofluosilicic acid.

Silicomanganese.
Alloys consisting principally of manganese, silicon and carbon. Three forms are usually marketed having approximately the following analyses:

	Per Cent		
	(1)	(2)	(3)
Manganese	65 to 70	65 to 70	65 to 70
Silicon	20 to 25	16 to 20	16 to 20
Carbon	1.00 (max.)	2.00 (max.)	2.5 (max.)

Forms available: In crushed form or in lumps up to 75 lbs.
Uses: For making low-carbon steel in which silicon is not objectionable, silicomanganese may be used effectively for the introduction of manganese on account of its low carbon content. It is also used effectively for 13% manganese steel when large quantities of returned scrap are in the charge. Makers of low carbon-chromium and manganese steels favor it on account of the low carbon to manganese ratio.
See also manganese steels under Iron and steel (Ferrum).

Silicon Si.
Color and properties: (a) Gray, amorphous, nonmetallic element, which burns in air when ignited.
(b) Also obtained as hard, lustrous, crystalline leaflets which do not burn in air. Is a non-conductor of electricity.

Constants	(a)	(b)
Specific gravity	2.00	2.49
Melting-point	....	1,420°C.
Boiling-point	....	3,500°C.

Soluble in hydrofluoric acid and alkalis; insoluble in water, nitric acid and hydrochloric acid.
Derivation: (a) By heating sand with coke in an electric furnace. (b) heating sand with powdered magnesium and treating the mixture with water.
Method of purification: Treatment with hydrochloric and hydrofluoric acids.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Impurities: Iron; carbon.

Grades: Technical.

Containers: Wooden kegs.

Uses: Manufacture of silicon tetrachloride, silicon-bronze, silicon-copper and ferro-silicon; production of hydrogen.

Railroad shipping regulations: None.*

Silicon-bronze. An alloy of copper, tin and silicon used for telephone and telegraph wires.

Silicon Carbide. Carbrosolite.

Silicon Chloride. See Silicon tetrachloride.

Silicon-copper (Copper silicide).

Color and properties: A hard, tough, bronze-like alloy.

Derivation: From silicon and copper electrolytically.

Grades: Technical.

Containers: Boxes.

Uses: Manufacture of silicon-bronze.

Railroad shipping regulations: None.*

Silicon, Ferro-. See Ferrosilicon.

Silicon Fluoride (Silicon tetrafluoride) SiF_4.

Color and properties: Colorless gas; suffocating odor; fumes strongly in air.

Absorbed readily in large quantities by water with partial decomposition.

Derivation: (1) Action of hydrofluoric acid or concentrated sulfuric acid and a metallic fluoride on silica or silicates. (2) By strongly heating fluorspar with concentrated sulfuric acid. (3) Direct synthesis.

Uses: Manufacture of fluosilicic acid; chemical analysis.

Silicon Tetrachloride (Silicon chloride) $SiCl_4$.

Color and properties: A clear, colorless, exceedingly mobile, fuming liquid; suffocating odor.

Constants: Sp.gr. 1.524; m.p. −89°C.; b.p. 56.9°C.

Decomposes in water.

Derivation: Silicon carbide is packed around a resistor and electrically heated, whereupon chlorine is passed through the mass and the silicon tetrachloride condensed from the escaping gas.

Impurities: Silicon hexachloride.

Grades: Technical.

Containers: Iron drums.

Uses: Smoke screens in warfare.

Railroad shipping regulations: White label.

Silicon Tetrafluoride. See Silicon fluoride.

Silicotungstic Acid (Silicowolframic acid) $4H_2SiO_2.12WO_3.22H_2O$.

Color and properties: White to yellowish-white crystals.

Soluble in water and alcohol.

Derivation: By heating ammonium silicotungstate with aqua regia.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: Kegs; glass bottles.

Uses: Chemical reagent for alkaloids; mordant for basic dyes.

Railroad shipping regulations: None.*

Silicowolframic Acid. See Silicotungstic acid.

Silk, Artificial. See Rayon.

Sillimanite (Fibrolite) $Al(AlO)SiO_4$. The mineral.

A natural silicate of aluminum corresponding to the same formula as andalusite (q.v.). Color: brown, grayish-brown, grayish or olive green, grayish-white; uncolored or white streak; vitreous luster. It is the most stable of the three aluminum silicates, andalusite, cyanite and sillimanite, the two former being converted into the latter when strongly heated.

Constants: Sp.gr. 3.23 to 3.24; hardness 6 to 7.

Occurrence: United States (Massachusetts, Connecticut, New York, Pennsylvania, North Carolina), Bohemia, Austria, India, Germany, France, Brazil.

Sillimanite. The refractory material. A high heat-resisting material containing a maximum amount of mullite, developed from the alteration of andalusite during firing. This necessitates firing above 1,550°C. for the development of a suitable crystalline structure.

Constants:

Vitreous grade: Coefficient of linear expansion 3.1 to 3.8 x 10^{-6}; m.p. 1,810°C.; sp.gr. 2.6 to 2.8; dielectric strength ("Te" value) 690°C.; tensile strength 9,000 to 14,000 lbs. per equivalent sq. in.

Refractory grade: Thermal expansion 5 x 10^{-6}; m.p. 1,810°C.; super-refractory load test; a standard 9-in. brick placed on end deforms 0.25% under a load of 25 lbs. per sq. in. at 1,510°C.; heat conductivity high compared to fire-clay products; extremely resistant to sag under load, a bar two inches wide by ½ in. thick, supported on knife edges ten in. apart will hold a load of 5 lbs. at 1,500°C.

Uses: Spark plugs; chemical laboratory ware; pyrometer tubes; special porcelain shapes; furnace patch and refractories.

"Sil-O-Cel." A proprietary brand of diatomaceous earth and heat insulation products made therefrom.

Silver (Argentum) Ag.

Color and properties: White, malleable, lustrous, soft, ductile metal, sometimes found native, but more frequently as the sulfide or other compound. Silver is found in nature in the following minerals or ores: Acanthite, amalgam, argentite, brongniardidite, bromyrite, calaverite, cerargyrite, dyscrastite, electrum, embolite, freibergite, freieslebenite, galena, hessite, iodyrite, krennerite, nagyagite, petzite, polybasite, proustite, pyrargyrite, stephanite, stromeyerite, sylvanite and xanthoconite. The silver of commerce comes chiefly from galena, argentite, pyrargyrite, cerargyrite and the complex ores from the cobalt district in Canada. The world's silver now comes chiefly from the United States, Canada, Mexico, and South America.

Constants: Sp.gr. 10.53; m.p. 961.5°C.; b.p. 1,955°C.

Soluble in nitric acid and hot concentrated sulfuric acid; insoluble in water and alkalis.

Derivation: (a) Amalgamation with mercury, which is afterwards distilled off and used again.

(b) Extraction with alkali cyanides followed by precipitation with zinc or aluminum.

(c) By fusion of the ore with lead and oxidation of the latter.

Method of purification: For chemical purposes silver is purified by dissolving in nitric acid, precipitating the chloride with hydrochloric acid, washing the chloride, dissolving and precipitating with pure zinc.

Impurities: Other metals, particularly lead.

Forms available: Pure, sterling, coin in sheet, wire, tubing, rivets, contacts, granulated, solder, wire, anodes, crucibles.

Uses: Alloys; solder; jewelry; foil; wire; coins; chemical apparatus; manufacture of mirrors; silver plating; table-ware; ornamentation, cutlery; dentistry; surgery; preparation of silver salts.

Railroad shipping regulations: None.*

Silver Acetate $AgC_2H_3O_2$.

Color and properties: White crystals or powder.

Moderately soluble in hot water.

Uses: Medicine (substitute for silver nitrate in treatment of ophthalmia of new-born infants, unofficial).

Railroad shipping regulations: None.*

Silver Arsphenamine (Silver diaminodihydroxyarsenobenzene, sodium salt; Silver salvarsan; Silver diarsenol).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Brownish-black powder (containing approximately 20% arsenic, 15% silver) for which the exact molecular formula has not been established. Unstable in air.
Soluble in water.
Derivation: By the action of silver salts on arsphenamine, converting the product to the disodium salt and precipitating with alcohol, acetone or ether.
Grades: Medicinal.
Containers: Ampules.
Uses: Medicine (the same as arsphenamine, unofficial).
Railroad shipping regulations: None.*

Silver Atoxylate. See Argatoxyl.

Silver Bromide $AgBr$.
Color and properties: Pale yellow crystals or powder, darkening on exposure to light, finally turning black.
Constants: Sp.gr. 6.473; m.p. 427°C; b.p.: Decomposes at 700°C.
Soluble in potassium bromide, potassium cyanide and sodium thiosulfate solutions; very slightly soluble in water and ammonium hydroxide.
Derivation: Silver nitrate is dissolved in water and a solution of alkali bromide added slowly. The precipitated silver bromide is washed repeatedly with hot water. The whole operation must be carried on in a dark-room under a ruby-red light.
Impurities: Silver nitrate; alkali bromide.
Grades: Technical.
Containers: Amber or black glass bottles.
Uses: Photography.
Railroad shipping regulations: None.*

Silver Caseinate. See Argonin.

Silver Chloride $AgCl$.
Color and properties: White granular powder, which darkens on exposure to light, finally turning black. Exists in several modifications differing in conduct towards light and also in their solubility in various solvents.
Constants: Sp.gr. 5.561; m.p. 451°C.
Soluble in ammonium hydroxide, concentrated sulfuric acid and sodium thiosulfate and potassium bromide solutions; very slightly soluble in water.
Derivation: Silver nitrate solution is heated and hydrochloric acid or salt solution added. The whole is boiled, then filtered, all in the dark or under a ruby-red light.
Method of purification: Re-solution in ammonium hydroxide and precipitation by hydrochloric acid.
Impurities: Silver nitrate.
Grades: Technical; C.P.
Containers: Amber or black glass bottles.
Uses: Photography; photometry; silver plating; production of pure silver; medicine.
Railroad shipping regulations: None.*

Silver Chloride, Colloidal. See Lunosol.

Silver Citrate. See Itrol.

Silver, Colloidal. Metallic silver, insoluble silver salts and silver protein precipitates in sufficiently finely divided form to assume the colloidal state and form permanent suspensions in water. They are prepared either by means of chemical reactions or electrolytically. They are used in medicine for antiseptic and antibacterial properties on mucous membranes, prophylaxis against gonorrheal infections and have also been used in the treatment of septicemia, rheumatic fever, diphtheria, cerebro-spinal meningitis, rhinitis, conjunctivitis, urethritis, etc. For a description of some of the commercial preparations see Argyrol, Argyn, Argoferment, Choleval, Collargol, Collene, Dispargin, Electrargol, Electrocollargol, Cargentos, Lunosol, Lysargin, Silvol, Solargentum, Synthargol, Proganol, Protargentum, Protargol.
Railroad shipping regulations: None.*

Silver Cyanide $AgCN$.
Color and properties: White, odorless, tasteless powder which darkens on exposure to light; very poisonous!
Constants: Sp.gr. 3.95; m.p.: Decomposes when heated.
Soluble in ammonium hydroxide, dilute boiling nitric acid and potassium cyanide and sodium thiosulfate solutions; insoluble in water.
Derivation: By adding sodium or potassium cyanide to a solution of silver nitrate.
Grades: Technical.
Containers: Amber or black glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Silver Diaminodihydroxyarsenobenzene, Sodium Salt. See Silver-arsphenamine.

Silver Diarsenol. See Silver arsphenamine.

Silver Gelatose. See Albargin.

Silver Glance. See Argentite.

Silver Haloids, Natural.
A series of natural haloids of silver forming a class of secondary minerals commonly found in the upper parts of silver deposits and occurring massive or in crusts with the consistency and luster of horn or wax, hence the term "horn silver." They may consist of the simple chloride, bromide or iodide, or may be mixed in varying proportions. The principal members of this series are chlorargyrite (q.v.), bromargyrite (bromyrite) (q.v.), embolite (q.v.), iodargyrite (iodyrite) (q.v.), iodembolite (q.v.). The name cerargyrite has been used for the chloride but it is now more commonly applied to the group as a whole.

Silver Ichthyol. See Ichthargon.

Silver Iodide AgI.
Color and properties: Pale yellow, odorless, tasteless powder, darkening on exposure to light.
Constants: Sp. gr. 5.675; m.p. 556°C.
Soluble in hydriodic acid, potassium iodide, potassium cyanide, sodium chloride and sodium thiosulfate solutions; insoluble in water and ammonium hydroxide.
Derivation: Silver nitrate solution is heated, alkali iodide solution added and the precipitate washed with boiling water, in the dark or under ruby-red illumination.
Impurities: Silver nitrate and alkali iodide.
Grades: Technical; pure.
Containers: Amber or black glass bottles.
Uses: Medicine; photography.
Railroad shipping regulations: None.*

Silver Lactate. See Actol.

Silver Leaf. See Stillingia.

Silver, Light Ruby. See Proustite.

Silver Methylene-nucleinate. See Sophol.

Silver Nitrate $AgNO_3$.
Color and properties: Colorless, transparent, tabular, rhombic crystals, becoming gray or grayish-black on exposure to light in the presence of organic matter; odorless; bitter, caustic metallic taste; corrosive and poisonous!
Constants: Sp.gr. 4.328; m.p. 218°C.; b.p.: Decomposes.
Soluble in cold water; more soluble in hot water, glycerol and hot alcohol; slightly soluble in ether.
Derivation: Silver is dissolved in dilute nitric acid and the solution evaporated. The residue is heated to a dull red-heat to decompose any copper nitrate, dissolved in water, filtered and recrystallized.
Grades: Technical; C.P.; U.S.P.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: 16, 50, 80, 100, 160, 200 oz. amber or black glass bottles.
Uses: Photography; hair dyeing; mother of pearl; reagent in chemical laboratories; silver plating; indelible ink; silver salts; glass manufacture; silvering mirrors; medicine (escharotic, germicide).
Railroad shipping regulations: Yellow label.

Silver Nitrate-ammonia-albumose. See Hegonon.

Silver Nitrate, Fused (Lunar caustic; Caustic, toughened).
Color and properties: White, hard pencils or cones containing not less than 94.5% silver nitrate. Odorless; bitter, caustic, and strongly metallic taste. Becomes gray or grayish-black on exposure to light in the presence of organic matter.
Solubilities similar to silver nitrate (q.v.).
Derivation: (a) By adding hydrochloric acid (4 parts) to silver nitrate (100 parts), melting and pouring into molds. (b) By melting silver nitrate (95 parts) and potassium nitrate (5 parts) together and pouring into molds.
Grades: U.S.P.
Containers: Amber or glass bottles.
Uses: Medicine (escharotic, germicide, counterirritant).
Railroad shipping regulations: Yellow label.

Silver Nucleinate. See Nargol.

Silver Ore, Brittle. See Stephanite.

Silver Ore, Dark Ruby. See Pyrargyrite.

Silver Ore, Light Red. See Proustite.

Silver Ore, Light Ruby. See Proustite.

Silver Ortho-phosphate. See Silver phosphate.

Silver Oxide Ag_2O.
Color and properties: Dark brown odorless powder; metallic taste; must not be triturated with organic matter, may cause explosions.
Constants: Sp.gr. 7.521; m.p.: Decomposes when heated above 300°C.
Soluble in ammonium hydroxide, potassium cyanide solution, nitric acid and sodium thiosulfate solution; very slightly soluble in water.
Derivation: Silver nitrate and alkali hydroxide solutions are mixed, the precipitate filtered and washed.
Grades: Technical; U.S.P.
Containers: Glass bottles.
Uses: Medicine; polishing glass; coloring glass yellow; catalyst; purifying drinking water.
Railroad shipping regulations: None.*

Silver Para-aminophenylarsonate. See Argatoxyl.

Silver Phenolsulfonate. See Silberol.

Silver Phosphate (Silver ortho-phosphate) Ag_3PO_4.
Color and properties: A yellow powder; turns brown when heated or on exposure to light.
Constants: Sp.gr. 7.321; m.p. 849°C.
Soluble in acids, potassium cyanide solution and ammonium hydroxide; very slightly soluble in water.
Derivation: By the interaction of silver nitrate and sodium phosphate.
Grades: Technical.
Containers: Amber or black glass bottles.
Uses: In photographic emulsions instead of the nitrate.
Railroad shipping regulations: None.*

Silver Picrate. See Picratol.

Silver-potassium Cyanide $KAg(CN)_2$.
Color and properties: White crystals; permanent in light; exceedingly poisonous!
Soluble in water and alcohol; insoluble in acids.
Derivation: By adding silver chloride to a solution of potassium cyanide.
Impurities: Silver.
Grades: Technical.
Containers: Glass bottles.
Uses: Silver plating; bactericide; antiseptic.
Railroad shipping regulations: None.*

Silver Protalbin. See Largin.

Silver Protein. See Omorol.

Silver Proteinate. See Novargan.

Silver Quinaseptolate. See Argentol.

Silver Salt. See Anthraquinone-2-sodium sulfonate.

Silver Salvarsan. See Silver arsphenamine.

Silver Sulfide Ag_2S.
Color and properties: A grayish-black, heavy powder.
Constants: Sp.gr. 6.85 to 7.32; m.p. 842°C.; b.p.: Decomposes.
Soluble in concentrated sulfuric and nitric acids; insoluble in water.
Derivation: By passing hydrogen sulfide gas into silver nitrate solution, washing and drying.
Grades: Technical.
Containers: Glass bottles.
Uses: Inlaying in niello metal-work.
Railroad shipping regulations: None.*

Silver Sulfocarbolate. See Silberol.

Silver Sulfophenylate. See Silberol.

Silver, Telluric. See Hessite.

Silver Vitellin. See Argyrol.

Silver White. See White, Cremnitz.

Silvol.
A colloidal silver-alkaline protein compound containing 20% silver.
Grades: N.N.R.
Uses: Medicine (antibacterial, unofficial).
Railroad shipping regulations: None.*
See also Silver, colloidal.

Simaruba Bark (Mountain damson; Bitter damson; Paradise tree; Paraiba).
Derivation: Bark of Simaruba officinalis.
Habitat: Guiana, Martinique and Jamaica.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Sinapis Alba (White mustard; Yellow mustard; Semen erucae).
Derivation: Seed of Sinapis alba.
Habitat: United States, Europe and Asia.
Grades: Technical.
Containers: Tins.
Uses: Condiment.
Railroad shipping regulations: None.*

Sinapis Nigra (Black mustard; Brown mustard).
Derivation: Seed of Brassica nigra or juncea.
Habitat: United States, Europe and Asia.
Grades: Technical; U.S.P.
Containers: Tins.
Uses: Medicine (rubefacient); condiment; mustard oil.
Railroad shipping regulations: None.*

Sinapis Oil. See Mustard oil.

Sinecain (Quinine hydrochloride and antipyrine).
A soluble double salt used in medicine for the hypodermic administration of quinine. Unofficial.
Railroad shipping regulations: None.*

Singer's Electric Cement. See under Cements, electric.

Sinopis.
A variety of red hematite (q.v.) used as a pigment.

Siomine. Hexamethylenetetramine tetraiodide containing 78.5% iodine. Insoluble in water. Used in medicine as a means of administering iodine internally. Unofficial.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Sipylite. A native erbium columbate, containing cerium and other metals. Found in Virginia.

Sisal.
Derivation: From the agave plant, Agave rigida, etc.
Habitat: Central America and West Indies.
Grades: Technical.
Containers: Bales.
Uses: Twine manufacture.
Railroad shipping regulations: None.*

Sismondine. See Micas, brittle.

Sissertskite. See Sysertskite.

Six-o-Six. Popular name for arsphenamine (q.v.).

Skin Glue. See Glue and gelatin.

Skull Cap. See Scutellaria.

Slag.
The fused product which separates in metal smelting and floats on the bath of metal. Formed by combination of flux with gangue of ore, ash of fuel, and perhaps furnace lining, and may include also oxides, sulfides, etc., derived from metal. The usual refining slags in metal melting are composed of oxidized impurities of the metal charged, the flux, and often of some of the furnace lining. In crucible steel melting no flux is added but a slag may form from oxidized impurities and the crucible wall. In basic electric practise the final slag may be reducing instead of oxidizing. In these cases, the slag is the medium by means of which impurities may be separated from metal. A non-reactive slag or cover, such as glass, may be used to protect the melt from the furnace atmosphere in melting brass. Cinder is a term used interchangeably with slag.

Typical Composition of Some Copper Slags:

	A ‡	*B* ‡	*C* ‡
Silica (SiO_2)	35.5	31.4	21.7
Iron oxide (FeO)	40.1	53.5	56.5
Lime (CaO)	6.3	2.8	0.5
Alumina (Al_2O_3)	8.3	4.6	4.1
Copper (Cu)	0.6	0.6	7.6
	90.8	92.9	90.4

‡ A.B.C.—Louis V. Bender, Gen. Supt., Anaconda Copper Mining Co., Anaconda, Montana.

Typical compositions of some iron and steel and lead slags appear in tables below.
Uses: Railroad ballast; material for highway construction; concrete aggregate; raw material for Portland cement, heat insulation, and fertilizer. See also slag wool.

Slag Cement. See under Cements, structural.

Slag Wool. See Mineral wool.

Slip Clay. See under Clays.

Slaked Lime. See Lime, hydrated.

Slate.
A fine-grained, sedimentary rock having much the same chemical composition as clays. Color usually bluish-gray, or may be green, black or red. Varieties may be classified as argillaceous, bituminous, calcareous, chlorite, damourite, diorite, hornblend, hydromica, mica, ottrelite, paragonite, sericite, siliceous, staurolite, talcose. Sometimes known according to the locality from which they are mined, e.g., Dolgelly, Penrhyn, Momable, Vireux, etc.
Occurrence: United States (New Jersey, Pennsylvania, Vermont, New York), Wales, England, Newfoundland, France, Belgium.
Uses: Roofs; billiard tables; switch boards; sinks; cisterns; flagstones; steps; tombstones; mantelpieces; pencils; schoolslates.

Slate Black. See under Blacks, Mineral black.

Slicker Wax. See Waxes, combination; Waxes, saturating; Waxes, finishing.

Slippery Elm. See Ulmus.

Sloe Leaf and Berries. See Viburnum prunifolium.

Sludge.
An organic material obtained by purifying city sewage. Obtained in two varieties:
(a) *Imhoff sludge:* A low-grade sludge containing from 2 to 3% ammonia and about 1% phosphoric acid.

Typical Composition of Some Slags of the Iron and Steel Industry

	A	*B*	*C*	*D*	*E*	*F*	*G*
Silica (SiO_2)	35	20	50	55	55	68-78	17.9
Alumina (Al_2O_3)	15	3	2	..	..	4-6	6.0
Lime (CaO)	44	40	2	2	2	small amts.	61.5
Magnesia (MgO)	2	10	0.5	0.5	..	small amts.	7.5
Oxides of iron (FeO and Fe_2O_3)	.1	15	30	16	7	11.5-16	0.3
Manganese oxide (MnO)	1	6	15	26	35	6-16	0.4
Phosphorus pentoxide (P_2O_5)	..	3.5	..	..	..	small amts.	..
Sulfur (S)	1.5	..	..	..	..	small amts.	1.3
Calcium carbide (CaC_2)	..	..	..	..	..	....	0.5
	99.5	99.5	99.5	99.5	99		95.4

A—Blast-furnace slag.
B—Basic open-hearth slag.
C—Acid open-hearth slag.
D—Acid open-hearth slag, low FeO, high MnO.
E—Acid open-hearth slag, low FeO, high MnO from Duplex process
F—Acid electric furnace slags (for steel castings).
G—Basic electric steel furnace slag.

Typical Composition of Some Lead Slags †

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
SiO_2	28	30	33	35	32	35	31	34	36
Fe(Mn)O	50	40	33	27	47	38	38	37	31
Ca(MgBa)O	12	20	24	28	11	17	21	19	23
Total	90	90	90	90	90	90	90	90	90

A—Quarter	Eilers
B—Half	La Pise-Eilers
C—Three-quarter	Schneider
D—1:1	Raht
E—Silicious quarter	Hahn
F—Half	Page
G—Silicious half	Livingstone
H—Half	Hahn
I—Three-quarter	Murray

† H. O. Hofman "Metallurgy of Lead," New York, McGraw-Hill Book Co., 1918.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

(b) *Activated sludge:* A high-grade sludge containing from 5.0 to 7.5% ammonia and from 2.5 to 4.0% phosphoric acid.
Derivation: (a) By running sewage through settling tanks without the access of air. The sludge, or solid matter, is settled by the aid of anaerobic bacteria. (b) By running sewage through settling tanks and forcing air in through porous plates at the bottom of the tanks. 20% of the current "make" is also added. The action of the anaerobic bacteria causes the solid organic matter to coagulate and settle. It is subsequently filtered and dried.
Uses: Fertilizer.
Railroad shipping regulations: None.*

Sludge, Acid. Waste or spent sulfuric acid, usually that from refining petroleum oils or crude benzenes.

Sludge Asphalt. Asphalt-like products obtained by separation from the acid sludge produced in the refining of petroleum.
Railroad shipping regulations: None.*

Small Fennel Flower. See Nigella sativa.

Smalt.
Color and properties: Blue powder.
Derivation: A potash-cobalt glass made by fusing pure sand and potash with cobalt oxide, grinding and powdering.
Grades: Technical.
Containers: Wooden kegs.
Uses: Paint pigment; ceramic industries (pigment); coloring glass; bluing paper, starch and textiles; coloring rubber.
Railroad shipping regulations: None.*

Smaltite (CoNi)As_2.
Tin-white to steel-gray metallic mineral resembling linnaeite and cobaltite, metallic luster. Varies widely in proportion of cobalt and nickel and usually contains some iron and sulfur. When pure, contains 28% cobalt but usually about 20%. Soluble in nitric acid. See Chloanthite.
Constants: Sp.gr. 6.4 to 6.6; hardness 5.5 to 6.
Occurrence: United States (Colorado, Missouri, New Jersey), Canada (Ontario), Germany.
Uses: Cobalt-nickel ore.

Smithsonite (Dry bone) $ZnCO_3$.
A white mineral often colored yellow or brown by iron. Vitreous to dull luster. Contains 64.8% of zinc oxide. Distinguished from other carbonates by its hardness. Soluble in acids. Many zinc deposits consist in their upper portions of smithsonite and calamine.
Constants: Sp.gr. 4.3 to 4.5; hardness 5.
Occurrence: United States (Mississippi Valley, New Mexico), Silesia.
Uses: Source of zinc.

Smudge Oil. An oil burned in fruit orchards to prevent frost injuring the trees. Californian smudge oil has a gravity of 26° to 28°Bé.
Railroad shipping regulations: None.*

Snake Root. See Serpentaria.

Snake-root Oil. See Asarum oils.

Snake-root Oil, Canada. See Asarum canadense oil.

Snake-weed. See Euphorbia pilulifera and Serpentaria.

Snapping Hazel. See Hamamelis.

Snowball Bush. See Viburnum opulus.

Snuff Bean. See Tonka.

Soamin. A proprietary brand of sodium arsanilate containing five molecules of water of crystallization. Used in medicine (similar to sodium arsanilate (q.v.), unofficial).
Railroad shipping regulations: None.*

Soap. Usually the sodium salt of oleic, stearic or palmitic acids or of a mixture of these, and in general of the fatty acids contained in natural fats and oils.

The tallow or other fat is mixed and gently heated in a tank with about one-fourth of the amount of caustic soda (in the form of a solution of 10°Bé.) necessary for complete saponification. After the mass has become homogeneous, additional caustic (in the form of a hot solution of 12° to 14°Bé.) is gradually added until the well stirred and boiling mixture becomes thick, homogeneous and clear. The mixture is now boiled more vigorously until sufficient water is driven off to leave a homogeneous ropy paste, whereupon solid salt or a concentrated solution of the latter is added to separate the soap from the lye, which is drawn off. The soap is again boiled vigorously for a short time to separate the retained residual lye.

The soap is next either molded at once or after "finishing" with dilute caustic or hot water, by heating, and stirring until it is more liquid and uniform and less granular.

Varieties: Rosin soaps as used for laundry purposes, are made by adding a soap made from rosin, or rosin itself to an ordinary soap. Castile or Marseilles soaps are made from olive oil. Mottled soaps are produced by the addition of small amounts of ferrous sulfate, ferric oxide or ultramarine. Transparent soaps are made from decolorized fats with the addition of glycerol or sugar, or both. Soap powder is a hydrated mixture of soap 20%, soda ash 40%, and the remainder water. Liquid soap is usually a potash soap dissolved in water, containing from 8 to 30%; the solutions of 30% and higher contain alcohol.

Soap Bark. See Quillaja.

Soap, Green. See Soap, soft.

Soap Lubricants.
Soft soap or fat combined with soda ash or potash.

Soap, Marine.
A special coconut oil soap which has the property of being soluble in both salt and fresh water.

Soap, Soft (Green soap). A yellowish-green, slippery, soft mass made from linseed oil and potassium hydroxide, soluble in hot water and hot alcohol.
Containers: 5, 25 lb. tins; 150 lb. kegs.
Uses: In medicine as a detergent, antiseptic and disinfectant, also as a lubricant.

Soaps, Acid. Soaps used to replace Turkey red oil in dyeing. They are made by adding acid to a dissolved soap but in sufficiently small quantities as just not to produce separation of the fatty acids.
Railroad shipping regulations: None.*

Soapstone. See Talc.

Soapwort. See Saponaria.

Sod Oil. See Degras.

Soda. See Sodium carbonate.

Soda Alum. See Aluminum-sodium sulfate.

Soda Ash Na_2CO_3.
Color and properties: The crude sodium carbonate of commerce, a grayish-white powder or lumps containing up to 99% sodium carbonate.
Soluble in water; insoluble in alcohol.
Derivation: (a) The Solvay ammonia soda process. Over 90% of the world's production is made by this process. (b) The Hargreaves-Bird electrolytic process. (c) The Leblanc process.
Impurities: Sodium chloride, sodium sulfate, calcium carbonate and magnesium carbonate.
Containers: Bags; barrels; also shipped in bulk in cars.
Grades: 48 and 58%, light; 48 and 58%, dense; 48%, ordinary (contains sodium chloride); 48%, special (contains sodium sulfate); granular; extra light. The distinction between "light" and "dense" soda ash is entirely one of consistency, the "dense" soda ash being preferred

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

when small bulk is desired, e.g., in glass manufacture.

Valuation: There is a wide divergence in the methods of stating the strength and purity of soda ash and the other alkalis. The method of stating the purity, with the exception of Germany and France, is nominally based on a statement of the per cent of sodium oxide (Na_2O) contained in the soda ash. However, sodium carbonate or soda ash became an article of commerce while chemical science was in its infancy. At an early date a method of computing the composition of soda ash from its chemical analysis was adopted, based on the chemical equivalents generally accepted at that time as being correct. This test was called the "Newcastle test." The advance of chemical science has since proven that this "Newcastle test" was seriously in error, but this old erroneous method has persisted in commercial use. At a later date the so-called "New York and Liverpool test" was devised which is even more irrational than the "Newcastle test" and at its time of invention must have been known to be erroneous. This method overstates the purity and quality of the product even more than the "Newcastle test" which may account for its introduction. It has commonly been used in the export trade of England and thus came into use in the United States. In this country at the present time commercial transactions in soda ash are based on an accurate statement of the per cent of sodium oxide based on modern knowledge of the chemical equivalents. In Germany soda ash is sold on a basis of the percentage content of sodium carbonate (Na_2CO_3), while in France it is sold according to Descroizille's degrees which give the strength of soda ash in terms of the percentage of sulfuric acid (H_2SO_4) which is chemically equivalent to the sodium carbonate present.

On the whole the most rational and desirable basis would seem to be to report and quote the strength of soda ash in terms of the percentage content of "actual alkali" (Na_2O). However, if a definite test is specified and the buyer and seller thoroughly understand the different tests there should be no trouble or confusion.

The following table shows the difference in the values of the common grades of soda ash as calculated by the different tests:

Actual alkali, (sodium oxide Na_2O)	German method, (sodium carbonate Na_2CO_3)	Newcastle test, (sodium oxide Na_2O)	New York and Liverpool, (sodium oxide Na_2O)	French method, (sulfuric acid H_2SO_4)
		Per Cent		
48.0	82.07	48.63	49.54	75.87
58.0	99.16	58.76	59.87	91.68

Containers: Bulk in cars; dense: 25, 100, 275 lb. boxes; 300 lb. bags; 450, 500 lb. barrels; light: 25 lb. boxes; 100 lb. kegs; 200, 300 lb. bags; 300 lb. barrels.

Estimated Distribution of Soda Ash in 1929: †

Consuming industries	Per Cent
Glass works	40.2
Soap	12.8
Chemicals	20.0
Cleansers and modified	7.5
Pulp and paper	6.6
Water softeners	3.6
Petroleum refining	1.6
Textiles	2.4
Exports	2.4
Miscellaneous	2.9
	100.0

† Based on data in Chem. & Met. 37:5 (1930).

Uses: Manufacture of pure sodium carbonate and bicarbonate, drugs, dyes, glass, soap, paper, caustic soda, paints, leather, enamel-ware and cleansers; dyeing textiles; water-softening; refining oils; wood preservation; metallurgy; laundering; bottle and dish-washing, etc.

Railroad shipping regulations: None.*

Soda, Baking. See Sodium bicarbonate or Potassium bicarbonate.

Soda Bordeaux Mixture. See Bordeaux mixture.

Soda, Carbonating. See Sodium carbonate.

Soda, Carbonic. See Sodium carbonate.

Soda, Caustic. See Sodium hydroxide.

Soda Niter. See Caliche.

Soda Orthoclase. See Feldspar.

Soda Pulp. See Paper pulp.

Soda Saltpeter. See Caliche.

Soda, Washing. See Sodium carbonate.

Sodalite $Na_4(AlCl)[Al_2(SiO_4)_3]$.

A complex mineral found in igneous rocks such as the nephelite-syenite and allied groups.

Color and properties: Gray, white, light blue; green, light red; vitreous to greasy luster.

Constants: Sp.gr. 2.14 to 2.30; hardness 5.5 to 6.

Occurrence: United States (Maine, Montana), Canada, Italy, Sicily, Germany, Transylvania, Portugal, Russia, Norway, Greenland.

Uses: Ornamental stone (takes good polish and resembles marble).

Sodamide. See Sodium amide.

Sodas, Modified.

Combinations of soda ash and bicarbonate of soda in definite proportions marketed for purposes where an alkali is needed ranging in causticity between bicarbonate of soda and soda ash. Modified sodas are white crystalline powders, readily soluble and possessing valuable cleansing and purifying properties. They are prepared in various strengths both as to alkalinity and causticity. Their industrial field is washing powders; laundry sodas; wool scouring powders; bottle cleansers; textile sodas; mild detergents.

Railroad shipping regulations: None.*

Sodas, Natural. See Trona, Thermonatrite, Natron.

Sodiomercuric Phenol Disulfonate. See Hermophenyl.

Sodium (Natrium) Na.

Color and properties: Light, soft, ductile, malleable, silver-white metal, oxidizing rapidly in air; of wax-like consistency at ordinary temperatures, but brittle at low temperatures; must be kept immersed in naphtha or other similar liquid which does not contain water or free oxygen.

Constants: Sp.gr. 0.9712; m.p. 97.6°C.; b.p. 877.5°C.

Decomposes water on contact with vigorous evolution of hydrogen, forming sodium hydroxide; insoluble in benzene, benzine, kerosene and naphtha.

Derivation: Electrolysis of molten sodium chloride, using a cathode of molten lead. The sodium-lead alloy which is formed is electrolyzed in a second compartment of the cell.

Method of purification: Distillation.

Grades: Technical.

Containers: 1, 5 lb. tins in cases.

Uses: Manufacture of other metals; amalgams; reducing agent in organic synthesis; dehydrating ether; flux; preparation of hydrogen; production of sodium peroxide, sodamide, sodium cyanide; chemical catalyst; desulfurizing petroleum.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Sodium Acetamine-mercuric Benzoate. See Toxynon.

Sodium Acetate $NaC_2H_3O_2.3H_2O$.

Color and properties: Colorless crystals, efflorescing on exposure to air. Retains its heat for a long time when fused.

Constants: Sp.gr. 1.4; m.p. 58°C.

Soluble in water; slightly soluble in alcohol.

Derivation: (a) Neutralization of pyroligneous acid with sodium carbonate, concentration of the solution, crystallization and centrifuging.

(b) Calcium acetate is treated with sodium sulfate and a little soda, the solution filtered, evaporated to dryness, the residue heated to about 250°C., dissolved in water, filtered, concentrated and crystallized.

Method of purification: Recrystallization.

Grades: Highest purity; pure fused; C.P.; U.S.P.; technical.

Containers: 1, 5 lb. bottles; 25 lb. boxes or cans; 100 lb. kegs; 300, 350, 375, 450 lb. barrels.

Uses: Intermediates; dyes; pharmaceuticals; cinnamic acid; acetic anhydride; copper acetate; mordant; soaps; photography; purification of glucose; meat preservation; medicine (diuretic); Schweinfurth green; filling foot-warmers, milk thermophores, etc.; reagent in analytical chemistry; separation of the opium alkaloids.

Railroad shipping regulations: None.*

Sodium Acetylarsanilate. See Arsacetin.

Sodium Acid Carbonate. See Sodium bicarbonate.

Sodium Acid Chromate. See Sodium bichromate.

Sodium Acid Fluoride. See Sodium bifluoride.

Sodium Acid Phosphate. See Sodium phosphate, monobasic.

Sodium Acid Sulfate. See Sodium bisulfate.

Sodium Acid Sulfite. See Sodium bisulfite.

Sodium Aluminate $Na_2Al_2O_4$.

Color and properties: White powder.

Constants: M.p. 1,800°C.

Soluble in water; insoluble in alcohol.

Derivation: By heating bauxite with sodium carbonate and extracting the sodium aluminate with water.

Grades: Technical.

Containers: Wooden kegs.

Uses: Mordant.

Railroad shipping regulations: None.*

Sodium-aluminum Sulfate (Soda alum; Porous alum) $Al_2(SO_4)_3.Na_2SO_4.24H_2O$.

Color and properties: Colorless crystals; saline, astringent taste; effloresces in air.

Constants: Sp.gr. 1.675; m.p. 61°C.

Soluble in water; insoluble in alcohol.

Derivation: By heating a solution of aluminum sulfate from alum slates and adding sodium chloride. The solution is allowed to cool, with constant stirring. The alum meal deposited is washed with water and centrifuged.

Method of purification: Recrystallization.

Grades: Pure crystals; technical; C.P.

Containers: 1, 5 lb. bottles; bulk in cars; 200 lb. bags; 350, 400 lb. barrels.

Uses: Textiles (mordant, waterproofing); dry colors; ceramics; tanning; paper size precipitant; matches; inks; engraving; sugar refining; water purification; medicine (astringent); confectionery.

Railroad shipping regulations: None.*

Sodium Amalgam Na_xHg_x.

Color and properties: A silver-white, porous, crystalline mass, containing 2 to 10% of metallic sodium.

Decomposes water.

Derivation: Mercury is heated to about 200°C. and sodium, in small pieces, added slowly.

Grades: 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, 10% alloy.

Containers: Glass bottles.

Uses: Preparation of hydrogen; reduction of metal halogen compounds and organic compounds; reagent in analytical chemistry.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Sodium Amide (Sodamide) $NaNH_2$.

Color and properties: White, crystalline powder.

Constants: M.p. 155°C.; b.p. 400°C.

Decomposes in water.

Derivation: Dry ammonia gas is passed over metallic sodium at 350°C.

Grades: Technical.

Containers: Wooden kegs.

Uses: Manufacture of sodium cyanide.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Sodium-aminobenzene Sulfonate, Para-. See Sodium sulfanilate.

Sodium-aminophenyl Arsonate. See Sodium arsanilate.

Sodium-ammonium Hydrogen Phosphate. See Sodium ammonium phosphate.

Sodium-ammonium Phosphate (Microcosmic salt; Sodium-ammonium hydrogen phosphate; Salt of phosphorus; Phosphorus salt; Fusible salt of urine) $NaNH_4HPO_4.4H_2O$.

Color and properties: Transparent, colorless, efflorescent, monoclinic crystals. Gives off water and ammonia on heating, leaving $NaPO_3$.

Soluble in water; insoluble in alcohol.

Constants: Sp.gr. 1.5; m.p. about 79°C. with decomposition.

Derivation: Mixing solutions of sodium phosphate and ammonium chloride.

Grades: Granular; C.P.

Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 25, 50 lb. kegs.

Uses: Standardizing uranium solutions, determination of Mg and Mn; reagent in blowpipe analysis.

Railroad shipping regulations: None(?)

Sodium-aniline Arsonate. See Sodium arsanilate.

Sodium-aniline Sulfonate. See Sodium sulfanilate.

Sodium Arsanilate (Atoxyl; Sodium-aniline arsonate; Sodium-aminophenyl arsonate) $C_6H_4NH_2(AsO.OH.ONa).H_2O$.

Color and properties: White, crystalline, odorless powder; faint salty taste; poisonous!; may produce optic atrophy.

Soluble in water.

Derivation: By dissolving arsanilic acid in sodium carbonate solution and crystallizing.

Method of purification: Recrystallization.

Grades: Technical; medicinal.

Containers: Tins; glass bottles.

Uses: Medicine (sleeping sickness, unofficial); organic synthesis.

Railroad shipping regulations: None(?)*

Sodium Arsenate $Na_3AsO_4.12H_2O$.

Color and properties: Clear, colorless crystals; mild alkaline taste; poisonous!

Constants: Sp.gr. 1.7593; m.p. 85.5°C.

Soluble in water; slightly soluble in alcohol; insoluble in ether.

Derivation: (a) Arsenic trioxide is heated with sodium nitrate, dissolved in water and crystallized.

(b) Arsenic trioxide is dissolved in sodium carbonate solution, sodium nitrate is added, the solution evaporated to dryness, the residue calcined, dissolved in water and crystallized.

Method of purification: Recrystallization.

Impurities: Sodium binarsenate.

Grades: Highest purity; pure crystals; pure dry; N.F.; C.P.; technical.

Containers: 1 lb. bottles; wooden kegs.

Uses: Medicine (antiseptic, alterative, tonic, antiperiodic); insecticides; dry colors; textiles

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

(mordant and assist in dyeing and printing); making other arsenates.
Railroad shipping regulations: Class B poison.

Sodium Arsenite (Sodium meta-arsenite) Na_2HAsO_3.
Color and properties: Grayish-white powder, which absorbs carbon dioxide from the air; poisonous!
Constants: Sp.gr. 1.87.
Soluble in water.
Derivation: Arsenic trioxide is dissolved in a solution of sodium carbonate or hydroxide and boiled for some time.
Grades: Crude; pure; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Manufacture of arsenical soaps for taxidermists; antiseptic; dyeing; insecticides; hide preservation.
Railroad shipping regulations: Class B poison.

Sodium Arsenite, Meta-. See Sodium arsenite.

Sodium Arsphenamine (Sodium salt of 3-diamino-4-dihydroxy-1-arsenobenzene; Sodium diarsenol) $NaONH_2C_3H_3As:AsC_2H_3NH_2ONa$, with a stabilizing medium.
Color and properties: Bright yellow powder containing not less than 19% arsenic; very unstable in air; poisonous!
Soluble in water.
Grades: U.S.P.
Containers: Ampules.
Uses: Medicine (the same as arsphenamine but does not require the addition of alkali before use, unofficial).
Railroad shipping regulations: None.*

Sodium Aurichloride. See Sodium-gold chloride.

Sodium Benzoate $NaC_7H_5O_2$.
Color and properties: White, amorphous, crystalline or granular, odorless powder; sweetish, astringent taste.
Soluble in water and alcohol.
Derivation: Benzoic acid is neutralized with sodium bicarbonate solution, the solution filtered, concentrated and allowed to crystallize.
Method of purification: Recrystallization.
Grades: Crude; pure; highest purity; U.S.P.
Containers: 1 lb. cartons; 1, 5 lb. bottles; 5, 25, 50 lb. boxes; 100 lb. kegs; 100, 250 lb. barrels.
Uses: Food preservative (its use for this purpose being limited by law in most countries); antiseptic; medicine; tobacco; pharmaceutical preparations; intermediate for manufacture of dyes.
Railroad shipping regulations: None.*

Sodium Benzosulfimide (Soluble saccharin; Crystallose) $C_6H_4COSO_2NNa.2H_2O$.
Color and properties: White, crystalline powder, very sweet taste.
Soluble in water, alcohol, ether and chloroform; insoluble in acids.
Derivation: By the action of sodium bicarbonate on saccharin.
Method of purification: Crystallization.
Impurities: Saccharin.
Grades: U.S.P.
Containers: Tins.
Uses: Sweetening compound; medicine (as a substitute for sugar).
Railroad shipping regulations: None.*

Sodium Benzosulfoparaminophenylarsenate. See Hectine.

Sodium Benzyl Succinate $C_6H_5CH_2O_2C(CH_2)_2COONa$.
Color and properties: White amorphous or crystalline powder having a slight benzyl odor and cool salty taste.
Soluble in hot and cold water.
Uses: Medicine (antispasmodic on smooth muscle).
Railroad shipping regulations: None.*

Sodium Beta-naphthol. See Microcidine.

Sodium Bicarbonate (Baking soda; Sodium acid carbonate) $NaHCO_3$.
Color and properties: White powder or crystalline lumps; cooling, slightly alkaline taste.
Constants: Sp.gr. 2.20; m.p.: Loses carbon dioxide at 270°C.
Soluble in water; insoluble in alcohol.
Derivation: (1) Solvay process: carbon dioxide passed into solution of salt and ammonia; (2) carbon dioxide passed into solution of cryolite fused with lime; (3) carbon dioxide passed into natural brine solution.
Method of purification: Recrystallization.
Impurities: Sulfuric acid; chlorine; silica; heavy metals; sodium thiosulfate; sodium carbonate; potassium salts; ammonium salts.
Grades: Commercial; pure; reagent; highest purity; C.P.; U.S.P.
Containers: 1, 5 lb. bottles and cartons; 5, 25, 50 lb. boxes; 100, 112 lb. kegs; 300 lb. bags; 300, 400 lb. barrels.
Uses: Manufacture of effervescent salts and beverages, artificial mineral waters, baking powder; reagent in analytical chemistry; gold and platinum plating; tanning industry; treating wool and silk; fire extinguishers; medicine (antacid, digestant); ceramics; preserving butter; prevention of timber mold.
Railroad shipping regulations: None.*

Sodium Bichromate (Sodium dichromate; Sodium acid chromate) $Na_2Cr_2O_7.2H_2O$.
Color and properties: Red, deliquescent, crystalline fragments.
Constants: Sp.gr. 2.52; m.p.: Loses $2H_2O$ at 100°C.; b.p.: Decomposes.
Soluble in water.
Derivation: Chrome iron ore is fused in a reverberatory furnace, with lime and soda in presence of air, followed by extraction with water, and acidification with sulfuric acid. The solution is filtered, concentrated and crystallized.
Method of purification: Recrystallization.
Impurities: Iron salts.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles and cans; 25 lb. boxes; 100 lb. kegs; 300 lb. barrels; 700 lb. casks.
Uses: Oxidizing agent; alums; dyes; intermediates; pharmaceuticals; perfumery; chrome pigments; tanning; textiles (mordant, oxidizing agent, waterproofing); electroplating; precious metals refining; engraving copper plates; bleaching oils, fats, waxes and sponges; medicine (antiseptic); glues; refining petroleum products; batteries; pyrotechnics; matches; analytical reagent.
Railroad shipping regulations: None.*

Sodium Bifluoride (Sodium acid fluoride) $NaHF_2$.
Color and properties: White, crystalline powder; poisonous!
Soluble in water.
Grades: Technical.
Containers: Tin.
Uses: Food preservative; preservative for zoological and anatomical specimens; etching glass; antiseptic.
Railroad shipping regulations: None.*

Sodium Binoxide. See Sodium peroxide.

Sodium Biphosphate. See Sodium phosphate, monobasic.

Sodium Bisulfate (Sodium acid sulfate; Niter cake; Nitre cake) $NaHSO_4$.
Color and properties: Colorless crystals or white, fused lumps; aqueous solution is strongly acid.
Constants: Sp.gr. 2.435; m.p. 300°C.
Soluble in water; decomposes in alcohol.
Derivation: A by-product in the manufacture of hydrochloric and nitric acids.
Method of purification: Recrystallization.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Impurities: Heavy metals; chlorides; arsenic; potassium bisulfate; sulfuric acid.

Grades: Pure crystals; pure fused; pure dry; reagent; crude; C.P.

Containers: 1, 5 lb. bottles; 100 lb. kegs; 250, 500 lb. barrels; bulk in cars.

Uses: Flux for decomposing minerals; substitute for sulfuric acid in dyeing; disinfectant for potable water (antityphoid); dyeing; manufacture of sodium sulfate; liberating carbon dioxide in CO_2 baths; in thermophores.

Railroad shipping regulations: None.*

Sodium Bisulfite (Sodium acid sulfite; Leucogen; Sodium-meta-bisulfite) $NaHSO_3$.

Color and properties: White crystals or crystalline powder; slight sulfurous odor; disagreeable taste.

Constants: Sp.gr. 1.48; m.p.: Decomposes.

Soluble in water; insoluble in alcohol.

Derivation: Sodium hydroxide solution is saturated with sulfur dioxide gas and the solution crystallized.

Method of purification: Recrystallization.

Grades: Crystals; pure dry; commercial dry; reagent; commercial solution: 33 1/3%; C.P.

Containers: Commercial, dry: 25 lb. boxes; 100 lb. kegs; 500 lb. barrels; 500, 600 lb. drums; solution: 500 lb. barrels. C.P.: 1, 5 lb. cans and bottles.

Uses: Chemicals (sodium salts, cream of tartar); dyes; intermediates; organic chemicals; perfumery; wood pulp (digestion); leather (depilatory, tanning); textiles (antichlor, mordant, discharge); food preservative; bleaching straw and cork; photographic reducing agent; fermentation industries (antiseptic); medicine (antiseptic); glucose and sugar syrups; brewing (cask sterilization); copper and brass plating; rubber (coagulating latex); general antiseptic; analytical reagent.

Railroad shipping regulations: None.*

Sodium Bisulfite, Meta-. See Sodium bisulfite.

Sodium Borate (Sodium tetraborate) $Na_2B_4O_7.10H_2O$.

Color and properties: White crystals or powder.

Constants: M.p.: red heat.

Soluble in water and glycerol.

Derivation: In California, colemanite (q.v.) is roasted at low heat in a rotary furnace. The powder is sifted and boiled with sodium carbonate and bicarbonate solution until decomposed, the calcium carbonate settles and the solution of borax is run into large tanks and crystallized. In Germany, boracite (q.v.) is decomposed by hydrochloric acid, the precipitated boric acid dissolved in boiling water and soda ash added.

Grades: Crystal; granulated; powdered (Refined, U.S.P.); C.P.

Containers: 1, 5 lb. bottles; 100 lb. kegs; 100 lb. sacks; 340, 390 lb. barrels; bulk (granulated only).

Uses: Medicine; textiles; metallurgy; tanning; ceramics; food preservative.

Railroad shipping regulations: None.*

For the natural product see Borax.

Sodium Bromate $NaBrO_3$.

Color and properties: White crystals or crystalline powder.

Constants: Sp.gr. 3.339; m.p. 381°C.

Soluble in water; insoluble in alcohol.

Derivation: By passing bromine into a solution of sodium carbonate, sodium bromide and sodium bromate being formed which are separated by crystallization.

Method of purification: Recrystallization.

Grades: Pure; reagent; C.P.

Containers: Glass bottles; 25 lb. tin boxes.

Uses: Analytical reagent.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Sodium Bromide (a) $NaBr$ (b) $NaBr.2H_2O$.

Color and properties: White, crystalline powder or granules; saline and somewhat bitter taste; absorbs moisture from the air, becoming very hard. Keep well stoppered.

Constants: Sp.gr. (a) 3.203; (b) 2.176; m.p. 757.7°C.; b.p. (a) 1,455°C.

Soluble in water; moderately soluble in alcohol.

Derivation: Ferroso-ferric bromide is dissolved in water, sodium carbonate added, the solution filtered and evaporated.

Method of purification: Recrystallization.

Grades: C.P.; U.S.P.; commercial; pure; highest purity.

Containers: 1, 5 lb. bottles; 25, 50, 100 lb. boxes; 100 lb. kegs; 500 lb. barrels.

Uses: Photography; medicine (similar to potassium bromide).

Railroad shipping regulations: None.*

Sodium Cacodylate (Sodium dimethylarsenate; Arsycodile) $(CH_3)_2AsOONa.3H_2O$.

Color and properties: White, amorphous powder; poisonous!

Soluble in water and alcohol.

Derivation: By the interaction of sodium carbonate and cacodylic acid.

Grades: Technical; U.S.P.

Containers: ⅛, ¼, ½, 1 oz. vials; 1, 4 oz. bottles; 1, 5, 10 lb. bottles.

Uses: Medicine (treatment of psoriasis and other skin diseases, tuberculosis, anemia, leukemia, asthma, chronic bronchitis, malaria).

Railroad shipping regulations: None.*

Sodium Carbolate. See Sodium phenate.

Sodium Carbonate. See Soda ash, Sal soda, Sodium bicarbonate, Sodium carbonate, monohydrate, Sodium sesquicarbonate.

Sodium Carbonate, Monohydrate (Crystal carbonate).

A crystalline sodium carbonate containing one molecule of water ($Na_2CO_3.H_2O$). It has an advantage over the ordinary soda crystals in that it contains a higher percentage of alkali (Na_2O) and is usually purer. In addition it is more readily dissolved in water than the soda crystals because it raises the temperature in the act of solution instead of lowering it, as is the case when soda crystals are dissolved.

Railroad shipping regulations: None.*

Sodium Chlorate $NaClO_3$.

Color and properties: Colorless, odorless crystals; cooling, saline taste; must not be triturated with any combustible substance.

Constants: Sp.gr. 2.490; m.p. 255°C.; b.p.: Decomposes.

Soluble in water and alcohol.

Derivation: A concentrated alkaline solution of sodium chloride is heated and electrolyzed, the chlorate crystallizing out.

Method of purification: Recrystallization.

Grades: Technical; C.P.; U.S.P.

Containers: 1, 5 lb. bottles and cartons; 25 lb. boxes; 112 lb. wooden kegs.

Uses: Oxidizing agent; medicine; substitute for potassium chlorate, being more soluble in water; matches; explosives; recovery of bromine from natural brines; leather tanning and finishing; textile mordant.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Sodium Chloraurate. See Sodium-gold chloride.

Sodium Chloride (Table salt; Sea salt; Common salt) $NaCl$.

Color and properties: Colorless, transparent crystals or white, crystalline powder; occurs in nature as the mineral halite (q.v.); somewhat hygroscopic.

Constants: Sp.gr. 2.161; m.p. 804°C.; b.p. 1,490°C.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in water and glycerol; very slightly soluble in alcohol.
Derivation: (a) By solution of rock salt in water, filtration, and crystallization. (b) By evaporation and crystallization of naturally occurring brines. (c) By evaporation of sea water by the heat of the sun, and crystallization.
Method of purification: Recrystallization.
Impurities: Sulfates; heavy metals; alkaline earths; magnesium salts; ammonium salts.
Grades: Highest purity medicinal, crystals; highest purity, dried; highest purity, fine powder; highest purity, fused; reagent; reagent, fused; table salt; rock salt; C.P.; U.S.P.
Containers: 1, 5 lb. bottles and cartons; 25, 50 lb. kegs; 100, 200 lb. bags; 280 lb. barrels; bulk in cars.
Uses: Chemicals (sodium salts, hydrochloric acid, chlorine, metallic sodium); dyes; ceramic glazes; metallurgy (silver, gold, copper, zinc); refrigeration; glass; leather; food preservative; mineral waters; soap (salting out); cattle foods; fertilizers; production of sodium light for polariscopic, spectroscopic and other similar work; medicine; analytical chemistry; photography; paper.
Railroad shipping regulations: None.*

Sodium Chloroaurate. See Sodium-gold chloride.

Sodium Chromate $Na_2CrO_4.10H_2O$.
Color and properties: Yellow, translucent, efflorescent crystals.
Constants: Sp.gr. 2.71; m.p. 19.92°C.
Soluble in water; slightly soluble in alcohol.
Derivation: Chrome iron ore is melted in a reverbatory furnace with lime and soda, in presence of air. The melt is dissolved in water, a small amount of sodium carbonate added, the solution decanted, acidified with acetic acid, concentrated and crystallized.
Method of purification: Recrystallization.
Grades: Pure neutral; highest purity; technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Inks; dyeing; paint pigment; leather tanning; other chromates.
Railroad shipping regulations: None.*

Sodium Citrate $2Na_3C_6H_5O_7.11H_2O$.
Color and properties: White crystals or granular powder; pleasant acid taste.
Constants: M.p.: Loses $11H_2O$ at 150°C.; b.p.: Decomposes at red heat.
Soluble in water; slightly soluble in alcohol.
Derivation: Sodium sulfate solution is treated with calcium citrate, filtered, concentrated and crystallized.
Method of purification: Recrystallization.
Impurities: Calcium citrate; sodium sulfate.
Grades: Highest purity, medicinal; pure; commercial; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 1, 5, 10, 25, 50 lb. cans; 100 lb. kegs; 250, 260 lb. barrels.
Uses: Medicine (to correct excessive acidity of the urine); soft drinks.
Railroad shipping regulations: None.*

Sodium-coerulin Sulfate. See Indigo carmine.

Sodium Cyanide NaCN.
Color and properties: White, deliquescent, crystalline powder; exceedingly poisonous!
Soluble in water; slightly soluble in alcohol.
Derivation: (a) Sodamide is produced from sodium and ammonia. The sodamide is heated with charcoal and the resultant soda cyanamide is then heated with an excess of charcoal resulting in the formation of sodium cyanide. (b) By the fusion of calcium cyanamide, common salt and a small amount of calcium carbide.
Method of purification: Recrystallization.
Impurities: Sodium cyanate; sodium carbonate.
Grades: Commercial; pure; highest purity; C.P.
Containers: 1, 5 lb. bottles; various tins; 100 lb. drums; 25, 50, 100, 112, 200, 220 lb. tin-lined cases.
Uses: Extraction of gold and silver from ores; electroplating; heat treatment of metals; making hydrocyanic acid; insecticide.
Railroad shipping regulations: Class B poison.

Sodium Diarsenol. See Sodium arsphenamine.

Sodium Dichromate. See Sodium bichromate.

Sodium Dimethylarsenate. See Sodium cacodylate.

Sodium Dioxide. See Sodium peroxide.

Sodium Dithionate. See Sodium hyposulfate.

Sodium Dithiosalicylate. See Dithion.

Sodium Ethylate (Caustic alcohol) C_2H_5ONa.
Color and properties: White powder, sometimes having brownish tinge. Decomposed by moisture or moist living tissue into alcohol and sodium hydroxide.
Derivation: By carefully adding small amounts of sodium to absolute alcohol kept at a temperature of 10°C., heating carefully to 37.7°C., again carefully adding sodium, cooling to 10°C, and adding a like quantity of absolute alcohol as was used originally.
Uses: See Caustic alcohol, solution.
Railroad shipping regulations: Red label.

Sodium Ferricyanide (Red prussiate of sodium; Red prussiate of soda) $Na_3Fe(CN)_6.H_2O$.
Color and properties: Ruby-red, deliquescent crystals; poisonous!
Soluble in water; insoluble in alcohol.
Derivation: Chlorine is passed into sodium ferrocyanide solution, crystals of the ferricyanide separating out.
Method of purification: Recrystallization.
Impurities: Sodium ferrocyanide; sodium chloride.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Production of pigments; dyeing; printing.
Railroad shipping regulations: None.*

Sodium Ferrocyanide (Yellow prussiate of sodium; Yellow prussiate of soda) $Na_4Fe(CN)_6.12H_2O$.
Color and properties: Yellow, semi-transparent crystals; poisonous!
Constants: Sp.gr. 1.458.
Soluble in water; insoluble in alcohol.
Derivation: "Spent oxide" from illuminating gas manufacture is treated first with water and then with carbon bisulfide to remove ammonium and other soluble salts and sulfur. The residue is mixed with lime and heated in closed pans yielding ammonia and calcium ferrocyanide solution. A boiling solution of sodium chloride is added and the precpitate formed is heated with a solution of sodium carbonate. The solution is filtered, concentrated and crystallized.
Method of purification: Recrystallization.
Grades: Technical.
Containers: 25 lb. boxes; 100 lb. kegs; 500 lb. barrels; 450, 700 lb. casks.
Uses: Photography; manufacture of sodium ferricyanide; pigments; blue print paper; metallurgy; tanning; dyes.
Railroad shipping regulations: None.*

Sodium Fluoride (Fluorol) NaF.
Color and properties: Clear, lustrous crystals or white powder; poisonous!
Constants: Sp.gr. 2.766; m.p. 980°C.
Soluble in water; slightly soluble in alcohol.
Derivation: By adding sodium carbonate to hydrofluoric acid.
Impurities: Arsenic.
Grades: Pure, purified, free of arsenic; technical; C.P.
Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 350 lb. barrels.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Antiseptic and antifermentative in alcohol distilleries, etc.; food preservative; roach and rat poison; medicine; flux; enamels.
Railroad shipping regulations: None.*

Sodium Fluosilicate. See Sodium silicofluoride.

Sodium Formaldehyde-sulfoxylate. See Hydrosulfite-formaldehyde compounds.

Sodium Formate $NaCHO_2$.
Color and properties: White, deliquescent crystalline powder.
Constants: Sp.gr. 1.919; m.p.: Decomposes.
Soluble in water, slightly soluble in alcohol; insoluble in ether.
Derivation: Carbon dioxide and sodium hydroxide are heated under pressure.
Method of purification: Recrystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 500 lb. barrels.
Uses: Reducing agent; medicine (antirheumatic); manufacture of formic acid and oxalic acid; intermediates; organic chemicals; mordant.
Railroad shipping regulations: None.*

Sodium Furacrylate $C_4H_3OCHCHCOONa$.
Color and properties: Light brown powder.
Soluble in water.
Derivation: By treating furfural with sodium acetate and acetic anhydride.
Grades: Technical.
Containers: 100 lb. wooden barrels.
Uses: "Antiferment."
Railroad shipping regulations: None.*

Sodium Glycerinophosphate. See Sodium glycerophosphate.

Sodium Glycerophosphate (Sodium glycerinophosphate) $Na_2C_3H_7PO_6.H_2O$.
Color and properties: Yellowish, viscid liquid. White crystals or powder; saline taste.
Soluble in water and alcohol.
Derivation: By neutralizing glycerophosphoric acid with sodium carbonate.
Grades: Technical; N.F.; U.S.P.
Containers: Solution: 1, 5, 10 lb. bottles; 50 lb. carboys; crystals; 1, 5, 10, 25 lb. cans; 225 lb. barrels.
Uses: Medicine (for its phosphorus content).
Railroad shipping regulations: None.*

Sodium-gold Chloride (Sodium chloroaurate; Sodium chloraurate; Sodium aurichloride) $NaAuCl_4.2H_2O$.
Color and properties: Yellow crystals.
Soluble in water and alcohol.
Derivation: By mixing equal parts of gold chloride and sodium chloride.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Sodium Hydrate. See Sodium hydroxide.

Sodium Hydrosulfide (Sodium sulfhydrate) $NaSH.2H_2O$.
Color and properties: Colorless needles.
Soluble in water and alcohol.
Derivation: Obtained from calcium sulfide by treating it in the cold with sodium bisulfate.
Grades: Technical.
Containers: Glass bottles; wooden kegs.
Uses: Analytical chemistry; inorganic preparations.
Railroad shipping regulations: None.*

Sodium Hydrosulfite $Na_2S_2O_4$.
Color and properties: Yellowish-white powder.
Soluble in water; insoluble in alcohol.
Derivation: Zinc is dissolved in a solution of sodium bisulfite, the zinc-sodium sulfite precipitated by milk of lime leaving the hydrosulfite in solution. On adding salt the hydrosulfite, containing water of crystallization, is precipitated. The latter is removed by treatment with hot alcohol.
Grades: Technical.
Containers: 25 lb. boxes; 100, 224 lb. kegs.
Uses: Textiles (reducing agent for removing dyes from fabrics, discharge, bleaching agent and ingredient of vat liquor).
Railroad shipping regulations: None.*

Sodium Hydroxide (Caustic soda; Sodium hydrate; Ley; Lye; White caustic) NaOH.
Color and properties: White, deliquescent pieces, lumps or sticks; crystalline fracture. Keep well stoppered, absorbs water and carbon dioxide from the air. Handle with care; it destroys organic tissue.
Constants: Sp.gr. 2.13; m.p. 318°C.
Soluble in water, alcohol and glycerol.
Derivation: (1) By the electrolysis of sodium chloride; (2) by treating a solution of soda ash with a solution of lime commonly called "milk of lime." The lime and soda ash combine to form caustic soda and calcium carbonate. The former is soluble and remains in the solution while the latter is insoluble and is precipitated out of the solution. The precipitated calcium carbonate (lime mud) is removed from the caustic soda solution by filtration or decantation, thus leaving a clear solution of caustic soda.
Method of purification: Solution in alcohol, in which the carbonate, chloride and sulfate are practically insoluble, evaporation of the alcohol, followed by fusion.
Valuation: The same wide divergence exists in the methods of stating the purity and strength of caustic soda as exists in stating the purity of soda ash (q.v.). The method of stating the strength of caustic soda, outside of Germany and France, is based on the percentage content of sodium oxide or alkali. Caustic soda, however, became an article of commerce while chemical science was in its infancy. At an early date a method of computing the composition of caustic soda from its chemical analysis was adopted, based on chemical equivalents that were then generally accepted as being correct. This test was called the "Newcastle test." The advance of chemical science has since proven this test to be in serious error, but this old erroneous method has persisted in commercial use in England. At a later date the so-called "New York and Liverpool test" was devised. This test, however, is even more irrational than the "Newcastle test," and at its time of invention must have been known to be in error. This method overstates the purity and quality even more than the "Newcastle test," which may account for its introduction. This method has been commonly used in the export trade of England and thus came into use in the United States. In this country caustic soda is sold on the actual alkali (Na_2O) determined by chemical analysis and based on modern knowledge of chemical equivalents. In Germany caustic soda is sold on a basis of the alkali content expressed in terms of an equivalent per cent of sodium carbonate (soda ash). In France it is sold according to Descroizille's degrees, which give the strength of the caustic soda in per cent of sulfuric acid chemically equivalent to the alkali content.

On the whole the most rational and desirable basis would seem to be to report and quote the strength of caustic soda in terms of the percentage content of actual alkali (Na_2O) based on the modern chemical equivalents. However, if a definite test is specified and the buyer and seller thoroughly understand the test, there should be no trouble or confusion in commercial transactions.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

The following table shows the different values that may be obtained for the same grade of caustic soda according to the method used in calculating the chemical analysis. The grades taken for illustration are the ones common to the trade:

Actual alkali, sodium oxide, Na_2O. Per Cent	Newcastle, sodium oxide, Na_2O. Per Cent	New York and Liverpool, sodium oxide, Na_2O. Per Cent	German degree, sodium carbonate, Na_2CO_3. Per Cent	French degree, sulfuric acid, H_2SO_4. Per Cent	Actual caustic, NaOH. Per Cent
60	60.79	61.93	102.58	94.84	77.4
70	70.92	72.26	119.69	110.64	90.3
74	74.97	76.39	126.52	116.97	95.48
76	77.00	78.45	129.94	120.13	98.06

Grades: Commercial; ground; flake; granulated; purified by alcohol (sticks, lumps and drops); reagent, highest purity; C.P.; U.S.P.
Containers: U.S.P., C.P.: 1 lb. bottles; 5, 10 lb. cans; solution: 1, 5 lb. bottles; commercial: 25 lb. cans; 100, 400, 700 lb. drums; ground, flaked, etc.: 55 lb. barrels; 100, 400 lb. drums; solution: 110 gal. drums; 8,000 gal. tank cars.
Uses: Petroleum and vegetable oil refining; tanning; soap industry; textile industry; rayon; paper industry; organic synthesis; sodium salts; medicine (as a caustic); rubber industry.
Estimated Distribution of Sodium Hydroxide in 1929: †

Consuming Industries	Per Cent
Soap	15.5
Chemicals	13.6
Petroleum refining	17.5
Rayon	15.8
Lye	3.8
Exports	9.4
Textiles	6.1
Rubber reclaiming	6.0
Vegetable oils	1.7
Pulp and paper	5.6
Miscellaneous	5.0
	100.0

† Based on data in Chem. & Met. 37:5 (1930).

Railroad shipping regulations: None.*

Sodium Hypochlorite (Eau de Labarraque) NaOCl.
Color and properties: This salt is unstable in air unless mixed with sodium hydroxide. It is usually stored and used in solution, known as Eau de Labarraque, having a disagreeable, sweetish odor.
Constants: M.p.: Decomposes.
Soluble in cold water; decomposed by hot water.
Derivation: By electrolyzing a cold dilute solution of salt.
Grades: Technical.
Containers: 50, 100 lb. carboys.
Uses: Bleaching paper pulp, textiles, etc.; intermediates; organic chemicals; water purification; medicine (disinfectant).
Railroad shipping regulations: None.*

Sodium Hypophosphite $NaH_2PO_2.H_2O$.
Color and properties: Colorless, pearly, crystalline plates or white, granular powder; bitter-sweet, saline taste. Keep well stoppered. May explode if heated. Deliquescent.
Soluble in water, alcohol and glycerol.
Derivation: By neutralizing hypophosphoric acid with sodium carbonate.
Grades: Technical; C.P.; N.F.
Containers: Glass bottles.
Uses: Medicine (of doubtful value).
Railroad shipping regulations: None.*

Sodium Hyposulfate (Sodium dithionate) $Na_2S_2O_6.2H_2O$.
Color and properties: Large transparent crystals; bitter taste.
Constants: Sp.gr. 2.175.
Soluble in water; insoluble in alcohol and concentrated hydrochloric acid.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical reagent.
Railroad shipping regulations: None.*

Sodium Hyposulfite. See Sodium thiosulfate.

Sodium Indigotindisulfonate. See Indigo carmine.

Sodium Iodate $NaIO_3$.
Color and properties: White crystals.
Soluble in water.
Derivation: Interaction of sodium chlorate and iodine in presence of nitric acid.
Grades: C.P.
Containers: 1 lb. bottles.
Uses: Medicine (local disinfectant, unofficial).
Railroad shipping regulations: None.*

Sodium Iodide (a) NaI (b) $NaI.2H_2O$.
Color and properties: White cubical crystals or powder; saline, somewhat bitter taste.
Constants: Sp.gr.: (a) 3.665; (b) 2.448. M.p.: (a) 653°C. B.p.: (a) 1,350°C.
Soluble in water and alcohol.
Derivation: Ferroso-ferric iodide, prepared from iron, iodine and water, is treated with pure sodium carbonate, filtered, the solution concentrated and crystallized.
Method of purification: Recrystallization.
Impurities: Sodium iodate.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5, 7 lb. bottles; 10, 25 lb. jars; 100 lb. kegs.
Uses: Photography; solvent for iodine; organic chemicals; reagent in analytical chemistry; medicine.
Railroad shipping regulations: None.*

Sodium Lactate $CH_3CHOHCOONa$.
Color and properties: Colorless or yellowish syrupy liquid, very hygroscopic.
Soluble in water.
Derivation: Interaction of lactic acid with sodium carbonate.
Uses: Medicine (treatment of acidosis, unofficial).
Railroad shipping regulations: None.*

Sodium Manganate
(a) Na_2MnO_4;
(b) $Na_2MnO_4.4H_2O$;
(c) $Na_2MnO_4.6H_2O$;
(d) $Na_2MnO_4.10H_2O$.
Color and properties: Green crystals.
Constants: (d) M.p. 17°C.
Soluble in cold water; decomposed by hot water.
Derivation: Manganese dioxide is fused with sodium hydroxide or carbonate in presence of sodium nitrate. Extracted with cold water, concentrated in a vacuum and crystallized.
Grades: Technical.
Containers: Wooden barrels; glass bottles.
Uses: Manufacture of permanganate.
Railroad shipping regulations: None.*

Sodium Meta-vanadate $NaVO_3$.
Color and properties: Colorless, monoclinic, prismatic crystals.
Constants: M.p. 630°C.
Derivation: Sodium hydrate and V_2O_5 in water solution.
Method of purification: Recrystallization.
Grades: Technical; C.P.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Glass bottles; compressed paper drums.
Uses: Inks; fur dyeing; therapeutics; in photography to impart a red tone to films and plates; inoculation of plant life; mordants and fixers.
Railroad shipping regulations: None(?)*

Sodium Methylarsenate $Na_2O_2CH_3AsO.5H_2O$.
Color and properties: White crystalline powder.
Soluble in water; slightly soluble in alcohol.
Grades: Sold under various trade names.
Containers: Cartons.
Uses: Medicine (carrier of arsenic).
Railroad shipping regulations: None.*

Sodium Molybdate $Na_2MoO_4.2H_2O$.
Color and properties: Small, lustrous, crystalline plates.
Soluble in water.
Derivation: By the interaction of sodium hydroxide and molybdic acid.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Reagent in analytical chemistry; medicine; casein glues; paint pigment.
Railroad shipping regulations: None.*

Sodium-naphthalene Sulfonate $C_{10}H_7SO_3Na$.
Color and properties: Yellowish, crystalline plates.
Soluble in water.
Derivation: Naphthalene sulfonic acid is prepared by sulfonating naphthalene with sulfuric acid. The solution is treated with sodium carbonate filtered, concentrated and crystallized.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic preparations; naphthols.
Railroad shipping regulations: None.*

Sodium Naphthionate (Sodium naphthylamine sulfonate, alpha-).
$NaC_{10}H_6(NH_2)SO_3.4H_2O$.
Color and properties: White crystals.
Soluble in water.
Derivation: Alpha-naphthylamine is fused and poured into concentrated sulfuric acid, heated to 180°C., then oxalic acid is added. The molten mass is poured on to lead plates and baked for 8 hours to 180°C. When cold, the porous mass is neutralized with hot caustic soda solution, filtered, concentrated and crystallized.
Method of purification: Recrystallization.
Grades: Technical (paste, crystals).
Containers: Paste: 300, 500 lb. barrels; crystals: 340 lb. barrels.
Uses: For Riegler's reagent for nitrous acid.
Railroad shipping regulations: None.*

Sodium-naphthylamine Sulfonate. See Sodium naphthionate.

Sodium Nitrate (Nitratine) $NaNO_3$.
Color and properties: Colorless, transparent, odorless crystals; saline, slightly bitter taste.
Constants: Sp.gr. 2.267; m.p. 316°C.; b.p.: Decomposes.
Soluble in water and glycerol; slightly soluble in alcohol.
Derivation: By extraction of caliche Chile saltpeter) with water, filtration, concentration and crystallization.
Method of purification: Recrystallization.
Grades: Double refined crystals; double refined granulated; powder; fused powder; purified crystal; fused sticks; commercial; C.P.
Containers: Bags; tins; glass bottles.
Uses: Manufacturing sulfuric and nitric acids and potassium nitrate; oxidizing agent; fertilizer; flux; glass manufacture; pyrotechnics; reagent in analytical chemistry; medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.
See also Caliche.

Sodium Nitrate, BASF.
A proprietary brand of nitrogen fertilizer prepared from German synthetic ammonia. It is a white salt said to contain 16% nitrogen. Does not liquefy. Will not harden if kept in a dry place.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Sodium Nitrate, "Hopewell Arcadian."
An American proprietary brand of nitrogen fertilizer prepared from synthetic ammonia.
Analysis: N, 16.25%; NH_3 (equiv.), 19.77%; $NaNO_3$, 98.6%.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Sodium Nitrate, Synthetic. See Sodium nitrate BASF; also Sodium nitrate, "Hopewell Arcadian."

Sodium Nitrite (Diazotizing salts) $NaNO_2$.
Color and properties: Slightly yellowish or white crystals, sticks or powder. Oxidizes on exposure to air.
Constants: Sp.gr. 2.157; m.p. 213°C.; b.p.: Decomposes at red heat.
Soluble in water; slightly soluble in alcohol and ether.
Derivation: Sodium nitrate is fused in iron pans, lead added, a little at a time, the temperature being kept between 450° and 500°C. The fused mass is poured into water, neutralized with dilute acid (sulfuric or nitric) and filtered. The solution is concentrated in open pans to about 40°Bé. and crystallized.
Method of purification: Recrystallization.
Impurities: Potassium salts; chlorine; heavy metals; sulfates.
Grades: Commercial; reagent, sticks; highest purity, sticks; reagent, free from potassium; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. cans; 25 lb. boxes; 100 lb. kegs; 500, 600, 700 lb. barrels.
Uses: Dyestuff manufacture, for diazotizing; organic synthesis; preparation of nitric oxide; reagent in analytical chemistry; pharmaceuticals; photographic reagent; pickling meat.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Sodium Nitroprussiate. See Sodium nitroprusside.

Sodium Nitroprusside (Sodium nitroprussiate)
$Na_2Fe(CN)_5NO.2H_2O$.
Color and properties: Ruby-red, transparent crystals.
Constants: Sp.gr. 1.6803.
Soluble in water.
Derivation: Sodium ferrocyanide solution is treated with nitric acid, whereupon nitroprusside crystals separate.
Method of purification: Recrystallization.
Impurities: Sulfates.
Grades: Technical; crystals; reagent.
Containers: Glass bottles.
Uses: Testing silk for presence of animal hair; in Roussin's photometer; reagent in analytical chemistry for sulfur or sulfides and acetone.
Raliroad shipping regulations: None.*

Sodium Nucleinate.
Color and properties: Yellowish-white powder containing approximately 4.5% sodium.
Soluble in water.
Uses: Medicine (bactericide, unofficial).
Railroad shipping regulations: None.*

Sodium Oleate (Eunatrol).
Color and properties: White mass or powder.
Soluble in water with partial decomposition.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Action of alcoholic sodium hydroxide on oleic acid.

Grades: U.S.P.

Containers: 1, 5 lb. bottles.

Uses: Medicine (in treatment of gall stone, unofficial).

Railroad shipping regulations: None.*

Sodium Ortho-phosphate, Primary, Secondary and Tertiary. See Sodium phosphate, mono-, di- and tribasic.

Sodium Ortho-vanadate Na_3VO_4.

Color and properties: Colorless hexagonal prisms.

Constants: M.p. 866°C.

Soluble in water; insoluble in alcohol.

Derivation: Fusion of V_2O_5 and sodium carbonate.

Method of purification: Recrystallization.

Grades: Technical; C.P.

Containers: Glass bottles; compressed paper drums.

Uses: Inks; fur dyeing; therapeutics; in photography; inoculation of plant life.

Railroad shipping regulations: None(?)*

Sodium Oxalate $Na_2C_2O_4$.

Color and properties: White, crystalline powder; poisonous!

Soluble in water.

Derivation: Oxalic acid is dissolved in water, neutralized with sodium carbonate, the solution filtered, concentrated and crystallized.

Method of purification: Recrystallization.

Impurities: Sodium carbonate; sodium binoxalate; chlorine; sulfates; iron salts; potassium salts; organic impurities.

Grades: Commercial; reagent; highest purity; pure.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 300 lb. barrels.

Uses: Reagent in analytical chemistry; textile finishing; pyrotechnics; leather tanning and finishing.

Railroad shipping regulations: None.*

Sodium-para-acetylaminophenylarsonate. See Arsacetin.

Sodium-para-ethoxyphenylaminomethane Sulfonate (Neraltein; Nevraltein) $C_2H_5OC_6H_4NHCH_2SO_3Na$.

Color and properties: White crystals.

Soluble in water.

Uses: Medicine (antipyretic, antirheumatic, unofficial).

Railroad shipping regulations: None.*

Sodium-para-toluenesulfonchloramine (Tolamine; Tochlorine; Chlorazene; Chloramine-T) $CH_3C_6H_4SO_2NNaCl.3H_2O$.

Color and properties: White or slightly yellow crystals or crystalline powder. Contains not less than 11.5 nor more than 13% active chlorine. Slight odor of chlorine. Decomposes slowly in air liberating chlorine. Not to be confused with NH_2Cl which is also termed chloramine. Toxic if introduced in blood stream.

Soluble in water; more soluble in boiling water; insoluble in benzene, chloroform, ether; decomposed by alcohol.

Derivation: By the action of ammonia on toluene-para-sulfonic chloride under pressure. The toluene para-sulfonamide produced is subjected to the action of sodium hypochlorite in the presence of an alkali and the chloramine produced by crystallization.

Purification: Crystallization.

Grades: U.S.P.

Uses: Medicine (surgical disinfectant, infected wounds, mouth wash, irrigation of internal cavities).

Railroad shipping regulations: None.*

Sodium Perborate (Perborin; Perborax) (a) $NaBO_3.H_2O$ (b) $NaBO_3.4H_2O$.

Color and properties: White crystals with saline taste.

Constants: M.p.: Decomposes at 40°C.

Soluble in alkalis, glycerol and water.

Derivation: (a) Solutions of borax, sodium peroxide and hydrogen peroxide are mixed, heated slightly and allowed to crystallize. (b) Boric acid and sodium peroxide are mixed and poured into cold, acidified water. The crystals of perborate deposit are filtered out, and dried at 50°C.

Method of purification: Recrystallization.

Grades: Technical; C.P.; U.S.P.; N.F.

Containers: 1, 5 lb. cartons; 25, 50 lb. boxes; 100 lb. kegs; 225, 275 lb. barrels.

Uses: Oxidizing agent; deodorant; germicide; antiseptic; hydrogen peroxide; medicine; bleaching textiles, fats, oils, resins, waxes, bones, gelatin, bristles, straw, ivory, sponges; detergent soaps; dental compositions; textile dyeing and printing; cosmetics, toilet preparations and hair bleaches; laundries; analytical reagent.

Railroad shipping regulations: None(?)*

Sodium Perchlorate $NaClO_4$.

Color and properties: Colorless, deliquescent crystals. Must not be triturated with organic or combustible substances, may cause explosions.

Constants: M.p. 482°C.; b.p.: Decomposes.

Soluble in water and alcohol.

Derivation: (a) Sodium chlorate and sodium chloride are mixed and heated until fused. The unchanged chloride is leached out. (b) A cold solution of sodium chlorate is electrolyzed, the solution concentrated and crystallized.

Method of purification: Recrystallization.

Impurities: Sodium chloride; sodium chlorate.

Grades: Technical.

Containers: Glass bottles; wooden kegs.

Uses: Explosives.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Sodium Permanganate (Condy's liquid) $NaMnO_4.3H_2O$.

Color and properties: Purple to reddish-black crystals or powder.

Constants: M.p.: Decomposes.

Soluble in water.

Derivation: Sodium manganate is dissolved in water and a current of chlorine, carbon dioxide or ozone passed in. The solution is concentrated and crystallized.

Method of purification: Recrystallization.

Impurities: Sodium hydroxide; sodium manganate.

Grades: Technical; sold commercially in solution.

Containers: Wooden barrels.

Uses: Oxidizing agent; disinfectant; bactericide; manufacture of saccharin; antidote for poisoning by morphine, curare and phosphorus.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Sodium Peroxide (Sodium dioxide; Sodium superoxide; Sodium binoxide; Oxone) Na_2O_2.

Color and properties: Yellowish-white powder, turning yellow when heated. Keep away from alcohol and other similar inflammable liquids, as it will cause ignition, particularly in presence of water.

Constants: Sp.gr. 2.805; m.p.: Decomposes.

Soluble in cold water, developing great heat; decomposed by hot water.

Derivation: Metallic sodium is heated to 300°C. in aluminum trays in a retort in a current of dry air, from which the carbon dioxide has been removed.

Grades: Technical; dental; C.P.

Containers: 1, 10 lb. tins in 100 lb. cases; dental: 2 oz. tins; iron drums.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Oxidizing agent; deodorant; germicide; antiseptic; disinfectant; medicine; purifying air in sick rooms; bleaching textiles, fats, oils, resins, waxes, bones, gelatin, bristles, straw, ivory, sponges, feathers; medicinal soaps; organic chemicals; peroxides; water purification; pharmaceuticals; oxygen generation for diving bells, submarines, etc.; textile dyeing and printing; analytical reagent.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Sodium Phenate (Sodium phenolate; Sodium carbolate) NaC_6H_4OH.

Color and properties: White, deliquescent crystals. Keep well stoppered.

Soluble in water and alcohol.

Derivation: Phenol is dissolved in caustic soda solution, concentrated and crystallized.

Method of purification: Recrystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Antiseptic; in military gas-masks with charcoal and hexamethylenetetramine as absorbent for phosgene; salicylic acid; organic synthesis.

Railroad shipping regulations: None.*

Sodium Phenolate. See Sodium phenate.

Sodium Phenolsulfonate (Sodium sulfocarbolate) $NaC_6H_5OSO_3.2H_2O$.

Color and properties: Colorless crystals or granules, slightly efflorescent; chars at high temperature, evolving phenol.

Soluble in water, hot alcohol, glycerol.

Grades: U.S.P.

Containers: 1 lb. cartons; 5, 25, 50 lb. boxes; 25, 50 lb. cans; 100 lb. kegs; 250 lb. barrels.

Uses: Medicine (intestinal antiseptic, unofficial).

Railroad shipping regulations: None.*

Sodium Phenoneacetate. See Guaiacetin.

Sodium 1-Phenyl-2:3-dimethyl-5-pyrazolone-4-aminomethanesulfonate. See Melubrin.

Sodium Phenylglycinamide-para-arsonate. See Tryparsamide.

Sodium Phosphate, Dibasic (Disodium phosphate; Hydrodisodium phosphate; Disodium ortho-phosphate) $Na_2HPO_4.12H_2O$.

Color and properties: Colorless, translucent crystals or white powder; cooling, saline taste.

Constants: Sp.gr. 1.5235; m.p. 35°C.; b.p.: Loses $12H_2O$ at 100°C.

Soluble in water.

Derivation: (a) Precipitated from dicalcium phosphate solution by sodium carbonate. (b) Bone-ash or phosphorite is digested with dilute sulfuric acid, the solution filtered off and concentrated, refiltered, diluted, and the calcium precipitated with sodium carbonate. After filtration the solution is concentrated and crystallized.

Method of purification: Recrystallization.

Impurities: Arsenic; heavy metals; sulfates; nitrates; potassium salts.

Grades: Pure granular; twice purified, dried or crystal; highest purity; medicinal, crystal or dried; reagent; U.S.P.

Containers: 1, 5 lb. bottles; 25, 50 lb. boxes; 100 lb. kegs; 275, 350, 400, 500 lb. barrels.

Uses: Chemicals; dyes; fertilizers; pharmaceuticals; textiles (weighting silk, dyeing and printing, fire-proofing); fire-proofing wood, paper and other products; ceramic glazes; tanning; paint pigments; baking powders; galvanoplastics; soldering enamels; analytical reagent.

Railroad shipping regulations: None.*

Sodium Phosphate, Monobasic (Sodium acid phosphate; Monosodium phosphate; Monosodium ortho-phosphate; Sodium biphosphate) $NaH_2PO_4.H_2O$.

Color and properties: Large, transparent crystals; acid reaction.

Constants: Sp.gr. 2.040; m.p.: Loses $2H_2O$ at 200°C.

Soluble in water.

Derivation: By treating disodium phosphate with proper proportion of phosphoric acid.

Method of purification: Recrystallization.

Grades: Technical; pure; C.P.; U.S.P.

Containers: Wooden kegs; glass bottles.

Uses: Medicine (to increase the acidity of the urine; baking powders.

Railroad shipping regulations: None.*

Sodium Phosphate, Tribasic (Trisodium ortho-phosphate; Trisodium phosphate) $Na_3PO_4.12H_2O$.

Color and properties: Colorless crystals.

Constants: Sp.gr. 1.618 to 1.645; m.p. 77°C.; b.p.: Loses $11H_2O$ at 100°C.

Soluble in water.

Derivation: By saturation of phosphoric acid with sodium hydroxide and crystallization.

Method of purification: Recrystallization.

Grades: Commercial; highest purity; C.P.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100 lb. kegs; 350, 500 lb. barrels.

Uses: Water softeners; boiler compounds; water softening and soap substitute in the laundry industry; tanning industry; sugar purification; photographic developers; medicine (mild cathartic).

Railroad shipping regulations: None.*

Sodium Phosphotungstate (Sodium phosphowolframate) $2Na_2O.P_2O_5.12WO_3.18H_2O$.

Color and properties: White, granular powder.

Soluble in water.

Derivation: By neutralizing phosphotungstic acid with sodium carbonate.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Reagent for detecting and determining alkaloids.

Railroad shipping regulations: None.*

Sodium Phosphowolframate. See Sodium phosphotungstate.

Sodium-potassium Tartrate. See Potassium-sodium tartrate.

Sodium Prussiate, Red. See Sodium ferricyanide.

Sodium Prussiate, Yellow. See Sodium ferrocyanide.

Sodium-pyrocatechin Acetate. See Guaiacetin.

Sodium Pyrophosphate (Disodium pyrophosphate) $Na_4P_2O_7.6H_2O$.

Color and properties: Colorless, transparent crystals.

Constants: Sp.gr. 1.824; m.p.: The anhydrous salt melts at 970°C.

Soluble in water; insoluble in alcohol.

Derivation: By fusing disodium phosphate.

Method of purification: Crystallization.

Impurities: Disodium ortho-phosphate.

Grades: Pure crystal; pure dried; fused; C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 25, 50 lb. boxes; 100 lb. kegs.

Uses: Electro-analysis of metals; manufacture of iron pyrophosphate.

Railroad shipping regulations: None.*

Sodium Pyrovanadate $Na_2V_2O_7.8H_2O$.

Color and properties: Colorless six-sided plates.

Constants: M.p. 654°C.

Soluble in water. Insoluble in alcohol.

Derivation: Sodium hydrate and V_2O_5 in water solution.

Method of purification: Recrystallization.

Grades: Technical; C.P.

Containers: Glass bottles; compressed paper drums.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Inks; fur dyeing; therapeutics; in photography; inoculation of plant life.
Railroad shipping regulations: None(?)*

Sodium Rhodanate. See Sodium sulfocyanide.

Sodium Rhodanide. See Sodium sulfocyanide.

Sodium Salicylate $NaC_7H_5O_3$.
Color and properties: Lustrous, white, crystalline scales or powder; sweetish, saline taste. The salt prepared from natural salicylic acid has a faint, aromatic odor.
Soluble in water, alcohol and glycerol.
Derivation: By heating sodium phenate in an autoclave with carbon dioxide, dissolving and crystallizing.
Method of purification: Recrystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1 lb. bottles and cartons; 5, 25, 50 lb. boxes; 100 lb. kegs; 112, 224 lb. cases; 200 lb. barrels.
Uses: Medicine; production of salicylic acid.
Railroad shipping regulations: None.*

Sodium Selenite Na_2SeO_3.
Color and properties: White crystals.
Soluble in water; insoluble in alcohol.
Derivation: By neutralizing selenious acid with sodium carbonate and crystallizing.
Method of purification: Recrystallization.
Grades: Commercial; highest purity.
Containers: Glass bottles; wooden kegs.
Uses: Glass manufacture; reagent in bacteriology.
Railroad shipping regulations: None.*

Sodium Sesquicarbonate $Na_4H_2(CO_3)_3.3H_2O$.
Color and properties: White crystals.
Constants: Sp.gr. 2.112; m.p.: Decomposes.
Soluble in water.
Derivation: By boiling sodium carbonate solution, to remove carbon dioxide, the sesquicarbonate remaining, which, on cooling the solution, crystallizes out.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Sodium Sesquicarbonate, Native
Soda occurs in nature as the "sesquicarbonate" $Na_2CO_3.NaHCO_3.2H_2O$, which is a compound of equivalent amounts of sodium carbonate and sodium bicarbonate with two molecules of water. Extensive deposits of this mineral, known as "natrona," "trona," or "urao," are found in Hungary, Egypt, and the deserts of Africa, Asia and North and South America.

Sodium Silicate (Soluble glass; Sodium meta-silicate; Liquid glass; Water glass)
(a) Na_2SiO_3 (b) $NaSiO_3.9H_2O$ (c) $Na_2Si_4O_9$.
Color and properties: (Water glass) White to gray-white lumps or powder.

Constants:	(a)	(b)
Melting-point	1018°C.	48°C.
Boiling-point	......	Loses $6H_2O$ at 100°C.

Soluble in water and alkalis; insoluble in alcohol and acids.
Derivation: Silica (sand), calcined soda and powdered coal are heated together in a crucible, the molten mass is powdered when cold, is extracted with water and steam in an autoclave, followed by evaporation of the water.
Method of purification: Fusion and passing in a current of air.
Impurities: Sodium sulfide; iron.
Grades: Pure crystal; crude lumps or powder; C.P.; also marketed in form of solutions of various concentrations ranging from viscous semi-liquids to thin watery fluids.
Containers: Lumps: 600 lb. barrels or bags. Powder: Drums. Solutions: 56 gal. barrels; 50, 100 gal. drums; tank cars. C. P.: 1 lb. bottles; 1, 5 lb. cans.
Uses: Textiles (fire-proofing; weighting silk; resist in dyeing and printing; boiling of cotton); manufacture of corrugated paperboard, mailing tubes, veneer products, etc.; greaseproofing paper containers, etc.; manufacture of cements; concrete hardeners, etc., manufacture of cold water paints; filling for soap; cementing stones; waterproofing walls; in hydraulic and acid-proof mortars; dyeing and bleaching; cottonseed-oil refining; cementing-pipe insulation; preservative for eggs; in medicine for fastening splints; manufacture of abrasive wheels, stones, etc.; adhesive preparations; refining petroleum; ore flotation; lining Bessemer converters; stainproofing wood; sizing paper; boiler compounds; binder; digester linings; acid concentrator linings; ceramic cements; artificial stones; purification of fats and oils; sizing fertilizer bags; inks; paint removers; tanning.
Railroad shipping regulations: None.*

Sodium Silicate, Meta-. See Sodium silicate.

Sodium Silicofluoride (Sodium fluosilicate; Salufer) Na_2SiF_6.
Color and properties: White, odorless, tasteless, granular powder.
Constants: Sp.gr. 2.755; m.p.: Decomposes at red heat.
Very slightly soluble in cold water; insoluble in alcohol.
Derivation: By neutralization of fluosilicic acid with sodium carbonate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; 200 lb. bags; 450 lb. barrels.
Uses: Medicine (antiseptic); ceramic glazes; laundry (scouring agent); opal glass; artificial marble.
Railroad shipping regulations: None.*

Sodium Stannate ("Preparing salt") $Na_2SnO_3.3H_2O$.
Color and properties: White powder or lumps.
Soluble in water; insoluble in alcohol.
Derivation: (a) By fusion of meta-stannic acid and sodium hydroxide. (b) By boiling tin scrap and sodium plumbate solution.
Grades: Technical; C.P.
Containers: 1 lb. bottles; 100 lb. drums; 400 lb. barrels.
Uses: Mordant in dyeing; ceramics; glass.
Railroad shipping regulations: None.*

Sodium Stearate $NaC_{18}H_{35}O_2$.
Color and properties: White powder with fatty odor.
Soluble in hot water and hot alcohol.
Impurities: The commercial article contains varying quantities of sodium palmitate.
Uses: Medicine (unofficial).
Railroad shipping regulations: None.*

Sodium Subsulfite. See Sodium thiosulfate.

Sodium Succinate $Na_2C_4H_4O_4.6H_2O$.
Color and properties: White crystals.
Soluble in water.
Uses: Medicine (treatment of catarrhal jaundice, unofficial).
Railroad shipping regulations: None.*

Sodium Sulfanilate (Sodium-aniline sulfonate; Sodium para-aminobenzene sulfonate) $NaC_6H_4(NH_2)SO_3.2H_2O$.
Color and properties: White, lustrous, crystalline leaflets.
Soluble in water.
Derivation: Sulfanilic acid is dissolved in a solution of sodium hydroxide, or carbonate, concentrated and crystallized.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Recrystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Sodium Sulfate. See Sodium sulfate (anhydrous), Glauber's salt, Thenardite, Mirabilite, Salt cake.

Sodium Sulfate, Anhydrous Na_2SO_4.

Constants: Sp.gr. 2.671; m.p. 888°C.

Color and properties: White crystals.

Soluble in water and glycerol.

Derivation: As a by-product (1) in manufacture of hydrochloric acid from salt; (2) in the manufacture of soda ash and sodium carbonate in LeBlanc and Hargreave processes; (3) in manufacture of ammonium chloride from ammonium sulfate; and in other processes.

Grades: Highest purity, crystal and granular; highest purity, medicinal dried; pure dried; commercial; reagent, crystal; C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 25, 50 lb. kegs; wooden barrels.

Uses: Manufacture of sodium carbonate, glass and ultramarine; dyeing; freezing mixtures; reagent in analytical chemistry; medicine.

Railroad shipping regulations: None.*

See also Glauber's salt and Salt cake.

Sodium Sulfide, Fused or Concentrated (Sodium sulfuret) Na_2S.

Color and properties: Yellow or brick-red lumps.

Constants: Sp.gr. 1.856.

Soluble in water; slightly soluble in alcohol; insoluble in ether.

Derivation: By heating sodium acid sulfate with salt and coal to above 950°C.; extraction with water and crystallization.

Method of purification: Recrystallization.

Impurities: Ammonium salts; sodium sulfite; ferrous sulfide.

Grades: Crystal; crystal, free from sulfite; pure, fused; fused, reagent, crystal.

Containers: Crystals: Wooden barrels; fused: Iron drums.

Uses: Organic chemicals; dyes (sulfur); intermediates; rayon (denitrating); leather (depilatory); dyeing; paper pulp; solvent for gold in hydrometallurgy of gold ores; sulfiding oxidized lead and copper ores preparatory to flotation; flotation processes for lead and copper ores; calico printing; sheep dips; photographic reagent; engraving and lithography; analytical reagent.

Fire hazard: Dangerous.*

Railroad shipping regulations: Yellow label.

Note: Sodium sulfide in the crystalline form is non-hazardous.

Sodium Sulfite (a) Na_2SO_3 (b) $Na_2SO_3.7H_2O$.

Color and properties: White crystals or powder; saline, sulfurous taste.

Constants: Sp.gr.: (a) 2.6334; (b) 1.5939. M.p.: (a) 150°C.; (b) Loses $7H_2O$ at 150°C. B.p.: (a) Decomposes; (b) Decomposes.

Soluble in water; sparingly soluble in alcohol.

Derivation: Large sodium carbonate crystals are placed in a lead-lined vat on a perforated false bottom, a current of sulfur dioxide is passed up through the crystals, a solution of sodium disulfite collecting at the bottom of the vat. This is saturated with sodium carbonate, concentrated and allowed to crystallize.

Method of purification: Recrystallization.

Impurities: Heavy metals; arsenic.

Grades: Pure (crystal or dried); commercial; C.P. (crystal or dried); U.S.P. (crystal).

Containers: Crystals: 100 lb. kegs; 350 lb. barrels. Dry powder: 25 lb. boxes; 100 lb. kegs; 550 lb. barrels; C.P. and U.S.P.; 1, 5 lb. bottles; 1, 5 lb. cans, 25, 50 lb. kegs.

Uses: Dyes; intermediates; organic chemicals; sodium thiosulfate; textiles (bleaching delicate fabrics, antichlor); chemical reducing agent; preservative; photography (developer); engraving and lithography; medicine (antiseptic); silvering mirrors; treating rubber latex; sterilizing beer kegs.

Railroad shipping regulations: None.*

Sodium Sulfhydrate. See Sodium hydrosulfide.

Sodium Sulfocarbolate. See Sodium phenolsulfonate.

Sodium Sulfocyanate. See Sodium sulfocyanide.

Sodium Sulfocyanide (Sodium sulfocyanate; Sodium rhodanate; Sodium rhodanide) NaCNS.

Color and properties: Colorless, deliquescent crystals or white powder; poisonous!

Constants: M.p. 287°C.

Soluble in water and alcohol.

Derivation: By boiling sodium cyanide with sulfur.

Method of purification: Crystallization.

Grades: Technical; pure, crystal or dried; C.P.

Containers: 1, 5 lb. bottles; tins; 25 lb. crocks; 100 lb. kegs.

Uses: Analytical reagent; dyeing and printing textiles; medicine.

Railroad shipping regulations: None.*

Sodium Superoxide. See Sodium peroxide.

Sodium Tartrate (Sal tartar) $Na_2C_4H_4O_6.2H_2O$.

Color and properties: White crystals.

Constants: Sp.gr. 1.794.

Soluble in water; insoluble in alcohol.

Derivation: Neutralization of tartaric acid with sodium carbonate, concentration and crystallization.

Method of purification: Recrystallization.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden kegs.

Uses: Medicine.

Railroad shipping regulations: None.*

Sodium Tetraborate. See Sodium borate.

Sodium Tetraiodophenolphthalein. See Antinosin.

Sodium Thiosulfate (Sodium hyposulfite; "Antichlor"; Sodium subsulfite; "Hypo") $Na_2S_2O_3.5H_2O$.

Color and properties: White, translucent crystals; cooling taste and bitter after-taste.

Constants: Sp.gr. 1.729; m.p. 48°C.; b.p.: Decomposes.

Soluble in water and oil of turpentine; insoluble in alcohol.

Derivation: The waste sulfide liquors from Le Blanc soda process are oxidized by exposure to air, producing calcium thiosulfate. The solution of this is boiled with sodium sulfate, filtered, concentrated and crystallized.

Method of purification: Recrystallization.

Impurities: Sulfates; sulfites; free alkali; calcium sulfides.

Grades: Commercial; pure; crystals; highest purity, crystals and granular; C.P.; U.S.P.

Containers: 1, 5 lb. bottles; 25 lb. boxes; 100, 120 lb. kegs; 350 lb. barrels; 800 lb. casks.

Uses: Photography (fixing agent to dissolve unchanged silver salts from exposed negatives); chrome tanning; removing chlorine in bleaching and paper-making; extraction of silver from its ores; disinfecting drinking water; mordant in dyeing; reagent in analytical chemistry; medicine (treatment of skin diseases).

Railroad shipping regulations: None.*

Sodium Tungstate (Sodium wolframate) $Na_2WO_4.2H_2O$.

Color and properties: Colorless crystals.

Constants: Sp.gr. 3.259; m.p.: Loses $2H_2O$ at 100°C. and then melts at 698°C.

Soluble in water; insoluble in alcohol and acids.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By dissolving tungsten trioxide in caustic soda solution, concentration and crystallization.
Method of purification: Recrystallization.
Impurities: Chlorine; sulfates.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. cans; 25 lb. boxes; 100 lb. kegs.
Uses: Intermediate in manufacture of tungsten, tungstic acid and oxides; reagent in analytical chemistry; production of phosphotungstates and borotungstates; fire-proofing fabrics.
Railroad shipping regulations: None.*

Sodium Uranate (Uranium yellow; Yellow uranium oxide) Na_2UO_4.
Soluble in dilute acids; insoluble in water.
Derivation: By treating a solution of uranyl salt (nitrate or sulfate) with sodium carbonate, the sodium diuranate (NaU_2O_7) first precipitating being dissolved in excess carbonate to form the uranate.
Grades: Technical.
Containers: Glass bottles.
Uses: Manufacture of yellow-green fluorescent glass; porcelain painting; enameling.
Railroad shipping regulations: None.*

Sodium Valeriate C_4H_9COONa.
Color and properties: White deliquescent mass.
Soluble in water.
Uses: Medicine (nerve stimulant, unofficial).
Railroad shipping regulations: None.*

Sodium Vanadate. See Sodium ortho-vanadate.

Sodium Wolframate. See Sodium tungstate.

"Soilime." A lime residue from cyanamide, containing 50% of calcium oxide on a dry basis, one-third in the form of calcium hydroxide and two-thirds as the carbonate.

Soja-bean Oil. See Soya-bean oil.

Solar Oil.
(a) Gas oil from petroleum of the gulf and mid-continent fields. This product is usually exported to Great Britain.
(b) Two grades of illuminating oil produced from shale oil: Prima, sp.gr. 0.825 to 0.830; b.p. 175° to 180°C. Secunda, sp.gr. 0.830 to 0.835; b.p. 195° to 200°C.
(c) A pale yellow Russian petroleum product: sp.gr. 0.850 to 0.880; flash point, above 80°C.
Railroad shipping regulations: None(?)*

Solargentum.
Color and properties: Lustrous, black scales. A compound of gelatin and silver containing 19 to 23% colloidal silver.
Soluble in water; insoluble in alcohol, oils.
Uses: Medicine (antibacterial, unofficial). See also Silver, colloidal.
Railroad shipping regulations: None.*

Solder. An alloy consisting of two or more metals, having a melting-point below that of any of the constituent metals, and used for joining certain other metals together by filling a joint or covering the juncture, as distinguished from brazing, welding, etc. Ordinary solder is an alloy of equal parts of lead and tin, and melts at about 188°C. Zinc solder consists of three parts of lead and five of tin, and melts at 176°C. Solder for brass or copper contains two parts of lead and five of tin, and melts at 170°C. Gold solder consists of: gold, 10 parts; silver, 6 parts; copper, 4 parts. Soft solder consists of one-third lead and two-thirds tin, and melts at about 170°C. Solders of melting-points down to 95°C. are made of lead, tin and bismuth.

Soldering Acid. See Hydrochloric acid.

Solid Lubricants.
The principal solid lubricants are graphite, soapstone, talc, steatite, French chalk, mica and asbestos. These materials (with the exception of graphite) are generally incorporated in greases where they are valuable due to their ability to stay on the bearing at temperatures where the other ingredients melt and run off.

Soluble Blue. Soluble Prussian blue. Not to be confused with coal-tar dyes of similar name.

Soluble Glass. See Sodium silicate.

Soluble Indigo. See Indigo carmine.

Soluble Saccharin. See Sodium benzosulfimide.

Soluble Starch. See Starch, soluble.

Solurol (Hyminic acid; Nucleotinphosphoric acid) $C_{30}H_{46}N_4O_{15}.2P_2O_5$.
Color and properties: Yellow amorphous powder.
Soluble in water.
Uses: Medicine (uric acid solvent, gout, rheumatism, unofficial).
Railroad shipping regulations: None.*

Solvent Naphtha. See Naphtha, solvent.

Somnoform. A proprietary anesthetic stated to be a mixture of ethyl chloride (60 parts), methyl chloride (35 parts), and ethyl bromide (5 parts). Used considerably in dental operations.
Railroad shipping regulations: None.*

Sonnenschein's Reagent. See Phosphomolybdic acid.

Soot. A finely divided powder produced during the combustion of coal or wood, consisting essentially of carbon but containing some tar, ash, ammonium salts, etc. Used in agriculture as a fertilizer (especially valuable as a top dressing for wheat), and as a slug and snail repellant.
Railroad shipping regulations: None.*

Sophol (Silver methylenenucleinate).
Color and properties: Dark yellow powder, odorless, tasteless. A very powerful germicide containing 20% silver. Solutions are unstable and give off formaldehyde on standing or heating.
Soluble in water.
Uses: Medicine (astringent, antiseptic, inflammation of mucous membrane, gonorrheal ophthalmia, conjunctivitis, unofficial).
Railroad shipping regulations: None.*

Sorel Cement. See under Cements, structural, Magnesium oxychloride cement.

Sorel's Substitutes for Gutta-percha.
Mixtures said to contain gutta-percha, pitch, rosin, rosin oil, and slaked lime. Some mixtures may contain coal-tar and others china clay.

Soretite. See Hornblend.

Sorrel Salt. See Potassium binoxalate.

Soudan Coffee. See Cola.

Soude Douce. See Blanquette.

South American Kino. See Caraccas kino.

Soy Oil. See Soya-bean oil.

Soya-bean Oil (Soja-bean oil; Bean oil; Chinese bean oil; Soy oil).
Color and properties: Pale yellow, fixed oil.
Constants:

Specific-gravity	0.924-0.929
Melting-point	22°-31°C.
Refractive index	1.4760-1.4775
Solidifying point	-15° to -8°C.
Hehner value	94-96
Saponification value	190-200
Iodine value	121-139

Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: Soya-beans (Soja hispida, S. japonica or Phaseolus hispida) are crushed, packed into

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

jute bags, heated over jets of steam and pressed. Solvent extraction is now extensively used both alone and after pressing.
Method of purification: Oil to be used for edible purposes is bleached with fuller's earth; oil for technical use is purified with chemicals.
Grades: Coast; refined; crude. Soya-bean oil is frequently quoted on f.a.q. (meaning "fair average quality") and mentioning the district from which the oil is obtained. This is a very loose method of grading and is being abandoned in favor of chemically controlled specifications, established by such bodies as the New York Produce Exchange.
Containers: 75 lb. cases; 375, 400 lb. barrels; 8,000 gal. tank cars.
Uses: Soap manufacture; illumination; foods (this oil has always been one of the chief articles of diet in China, Japan, etc.); candles; inks; adulterant and substitute for linseed oil; paints and varnishes; cattle feeds; butter substitutes.
Railroad shipping regulations: None.*

Sozal. See Aluminum phenolsulfonate.

Sozoiodole. See Potassium sozoiodolate.

Spanish Blistering Flies. See Cantharides.

Spanish Chamomile. See Pyrethrum root.

Spanish Pellitory. See Pyrethrum root.

Spanish Grass. See Esparto.

Spanish Saffron. See Crocus.

Spanish Soapwort. See Gypsophila.

Spanish White. See Bismuth subnitrate.

Spar, Adamantine. See Corundum.

Spar, Corn. See Calcite.

Spar, Dogtooth. See Calcite.

Spar, Greenland. See Cryolite.

Spar, Heavy. See Barytes.

Spar, Hogtooth. See Calcite.

Spar, Ice. See Sanidine.

Spar, Iceland. See Calcite.

Spar, Nailhead. See Calcite.

Spar, Satin. See Calcite, also Gypsum.

Sparking Metal. See Pyrophoric alloy.

Sparteine $C_{15}H_{26}N_2$.
Color and properties: Yellowish, thick, oily, liquid alkaloid; bitter taste; distinctive peculiar odor; usually used in the form of the sulfate, hydriodide, hydrochloride and triïodide; poisonous!
Constants: B.p. 180° to 181°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: By extraction of the tops of Spartium scoparium (broom) with alcohol and evaporation of the latter.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Spearmint.
Dried leaves and tops of the herb Mentha spicata.
Habitat: Europe, Asia, eastern and central United States.
Uses: Flavoring material; source of spearmint oil.

Spearmint Oil
Color and properties: Colorless to pale yellowish liquid; characteristic odor.
Chief known constituents: Carvone (40-60%); linalool; pinene.
Constants: Sp.gr. 0.930 to 0.940; optical rotation —43°.
Soluble in alcohol, ether and chloroform.
Derivation: By distillation of the leaves of Mentha viridis (Michigan, Indiana).
Method of purification: Rectification.
Grades: Technical, U.S.P.
Containers: 5, 10 lb. bottles; 20, 25 lb. tins; 60 lb. cases.
Uses: Flavoring.
Railroad shipping regulations: None.*

Specular Coal. See Pitch coal.

Specular Iron Ore. See Hematite, red.

Speedwell. See Veronica.

"Spellerizing" (Roll-knobbling). A process used in the metallurgical industry by which the heated bloom is passed alternately through specially designed rolls, which have a number of projections on their surface, and through smooth rolls, in a manner which works the surface of the metal to eliminate any irregularities and to produce a uniformly dense surface finish.

Spent Acid. Mixed acid (q.v.) which has given up part of its nitric acid.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Spent Oxide. Iron sponge (q.v.) discarded from gas works as "spent" material. It is often rich in nitrogen, containing 5 to 10%, and for this reason is sometimes used as a fertilizer material. When so sold it is sometimes called "gashouse tankage." However, it also contains substances which are poisonous to plants and, therefore, it must be used cautiously.
Fire hazard: Dangerous.*
Railroad shipping regulations: Prohibited except when loaded in open steel cars.

Spermaceti (Cetaceum).
Color and properties: Pearly-white, unctuous, semi-transparent, concrete, fatty substance; almost odorless and tasteless; becomes rancid on exposure.
Chief constituents: Cetin, esters of laurinic, stearic and myristic acids.
Constants: Sp.gr. 0.945; m.p. 42° to 50°C.
Soluble in ether, chloroform, carbon, bisulfide and hot alcohol; insoluble in water and cold alcohol.
Derivation: Found in the head of the sperm-whale or floating in the ocean; is filtered under pressure to remove stearin, boiled with water and a small amount of caustic soda, followed by repeated washing with water.
Grades: Technical, U.S.P.
Containers: 50, 60 lb. cases.
Uses: Base for ointments, cerates and emulsions; manufacture of candles, soaps, etc.
Railroad shipping regulations: None.*

Sperm Oil. See Whale oil.

Sperrylite $PtAs_2$.
Tin-white mineral, black streak, metallic luster. Of very rare occurrence but of interest as the only native compound of platinum. Contains 52.57% Pt, 43.5% As, with some replacement of platinum by rhodium and palladium.
Constants: Sp.gr. 10.60; hardness 6 to 7.
Occurrence: United States (Wyoming, North Carolina, Nevada), Canada.

Spessartite. See Garnet.

Speziaite. See Hornblend.

Sphagnol. See Corba oil.

Sphagnum (Peat moss; Bog moss). The moss found in marshes and wet places, which when it decays and dies forms peat. It is a paler green in color than the true mosses and forms taller growths. Its stems and leaves possess colorless cells, which are connected by small perforations that have the property of sucking up, and the capacity to retain, large quantities of liquid.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

This moss was dried and extensively employed for its absorptive powers as a surgical dressing during the late war.
Railroad shipping regulations: None.*

Sphalerite (Blend; Zinc blend; Black-jack) ZnS, often containing Cd, Mn, Fe.
Yellow, brown or black mineral, resinous luster.
Contains 67% zinc. Soluble in hydrochloric acid.
Constants: Sp.gr. 3.9 to 4.1; hardness 3.5 to 4.
Occurrence: United States (Missouri, Idaho, Kansas, Oklahoma, Pennsylvania, Wisconsin, Virginia).
Uses: Source of zinc.

Sphene. See Titanite.

Spherosiderite. See Siderite.

Spiegel. See Spiegeleisen.

Spiegeleisen (Spiegel).
An alloy of manganese and iron which principally differs from ferromanganese (q.v.) in having a low manganese content. It may, perhaps, be more properly termed a high manganese pig iron. It has the following approximate analysis:

	Per Cent
Manganese	15 to 30
Carbon	4.5 to 5
Silicon (max.)	1.00
Sulfur	0.05
Phosphorus	0.15

M.p.: 1,950° to 2,265°F.
Uses: In Bessemer practice, molten spiegel from a cupola is added to the steel, after the blow, for recarburizing and obtaining the desired manganese content. In the case of low carbon Bessemer steel, 80% ferromanganese is used in place of spiegel. Spiegel is frequently used with scrap and pig iron in an open-hearth charge in order to raise the manganese content. It is more economical, however, to use a high manganese pig iron containing from 1.5 to 2% manganese.

In making effervescing steel, manganese is a good scavenger on account of its deoxidizing properties and its beneficial effect upon steel in the elimination of sulfur. Some of the troubles generally encountered in open steel are overcome by adding 0.10 to 0.20% manganese in the form of ferromanganese or by adding spiegel after oreing the bath. In the manufacture of deoxidized steels of forging quality, either carbon or alloy grade, or high grade castings, made in basic open-hearth furnaces, an addition of manganese in the form of ferromanganese or spiegel has been found highly satisfactory to clean up the bath after oreing. This is frequently accompanied by additions of silicon pig and results in a better product accompanied by a higher recovery of final alloy additions.
See also manganese steels under Iron and steel (Ferrum).

Spigelia (Pinkroot; Indian pink; Carolina pink; Maryland pink; Wormgrass).
Derivation: Dried rhizome and roots of Spigelia marilandica.
Habitat: North America.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Spike Oil. See Lavender spike oil.
The name spike oil is also applied to a mixture of lavender oil and oil of turpentine, colored with alkanet.

Spikenard.
Derivation: Root of Aralia racemosa.
Habitat: Northeastern United States.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Spikenard, American. See Aralia.

Spindle Oils. The lighter portions of petroleum distillates used for high-grade lubrication. According to the degree of decolorizing treatment, they range in color from dark red to almost colorless; they differ from paraffin oils in that for a given viscosity they are of higher Baumé gravity.
Characteristics of American spindle oils: Gr. 26° to 35°Bé.; flash point (Cleveland open cup) 320° to 450°F.; Saybolt viscosity at 70°F. 400 to 440; cold test 10° to 40°F.
Uses: High-grade engine oils; fast-running machinery; textile spindles; in fact, high-grade lubrication of all kinds except steam cylinders; medicine.
Railroad shipping regulations: None.
See also Lubricants, United States Government Master Specifications.

Spindle Tree. See Euonymus.

Spinel. $MgAl_2O_4$ or $MgOAl_2O_3$, with partial replacement of magnesium by iron or manganese and of aluminum by iron and chromium.
A natural magnesium aluminate.
Color and properties: Various shades of red grading into yellow, green, blue, brown or black; vitreous luster; white streak.
Constants:
Magnesium spinel: Sp.gr. 3.63 to 3.71. Sometimes contains chromium oxide. Usually classified as follows: Spinel ruby (deep red); balas ruby (rose red); rubicelle (yellow or orange red); almandine (violet).
Iron-magnesium spinel (pleonaste, ceylonite): Sp.gr. 3.5 to 3.6. Some replacement of magnesium and, possibly, aluminum by iron. Grades from brown to black, sometimes dark green.
Magnesium-iron spinel (chlorospinel): Sp.gr. 3.59. Partial replacement of aluminum by iron. Color, green.
Chromium spinel (picotite): Sp.gr. 4.08. Partial replacement of magnesium by iron. Also contains chromium. Dark yellowish-brown or greenish-brown color.
Zinc spinel (gahnite): Sp.gr. 4 to 4.6. Replacement of magnesium by zinc. Green to black.
Occurrence. United States (New York, New Jersey, Massachusetts, North Carolina, Alabama, California), Canada, Sweden, Italy, Finland, Austria, Ceylon, Siam, Burma.
Uses: Gem stones.

Spirit of Chloroform. See Chloric ether.

Spirit of Hartshorn. See Aromatic spirits of ammonia.

Spirit, Potato. See Amyl alcohol, fermentation.

Spirits. In medicine, alcoholic solutions of volatile principles, procured either by distillation or by simple dilution. Spirits as a rule are prepared by solution of the active substance in alcohol, and are employed as therapeutic agents or merely as flavoring agents.

Spirits, Cologne. See Ethyl alcohol.

Spirits, Columbian. See Methyl alcohol.

Spirits, Columnian. See Methyl alcohol.

Spirits of Ammonia, Aromatic. See Aromatic spirits of ammonia.

Spirits of Niter, Sweet.
Color and properties: Clear mobile liquid of pale yellow or greenish-yellow tint.
Derivation: Alcoholic solution of ethyl nitrite.
Containers: Well-stoppered amber bottles, kept in cool, dark place.
Uses; Medicine (diaphoretic and diuretic).
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Spirits of Nitre. Medical term for nitric acid.

Spirits of Turpentine. See Turpentine oil.

Spirits of Wine. See Ethyl alcohol.

Spiroform. See Phenyl acetylsalicylate.

Spirosal. See Glycol salicylate.

Split Nut. See Physostigma.

Spodumene $LiAl(SiO_3)_2$.
Color and properties: White, pale green, emerald, green, pink or purple mineral; white streak; vitreous luster. Contains 8.4% Li_2O with some replacement by sodium. Insoluble in acids. Hiddenite and kunzite are gem varieties.
Constants: Sp.gr. 3.13 to 3.20; hardness 6.5 to 7.
Occurrence: United States (North Carolina, California, Massachusetts, South Dakota), Brazil, Madagascar.
Uses: Occasionally mined as a source of lithium salts. Also mined for gems.

Spogil Seeds. See Ispaghula.

Sponge, Platinum. See Platinum black.

Spoonwort Oil.
Color and properties: Essential oil; pungent odor similar to that of mustard oil; contains 87 to 98% butyl mustard oil.
Constants: Sp.gr. 0.933 to 0.950; optical rotation +52° to +56°C.
Solubility in alcohol: In 3 to 10 vols. of 80% alcohol; in 1 or more vols. of 90% alcohol.
Derivation: Distilled from the fresh herbs Cochlearia officinalis, L.
Railroad shipping regulations: None.*

Sporogelite. Proposed name for bauxite (q.v.).

Spotted Cowbane. See Conium.

Spotted Hemlock. See Conium.

Spruce Oil.
Color and properties: Colorless liquid; characteristic, agreeable odor.
Chief known constituents: Pinene, cadinene and bornyl acetate.
Constants: Sp.gr. 0.905 to 0.910; optical rotation −22° to −25°.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: By distillation from the leaves and twigs of Picea alba or Picea nigra.
Method of purification: Rectification.
Grades: Technical.
Containers: 5, 10 lb. bottles; 50 lb. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Spruce Sulfite Extract.
Derivation: A by-product in the paper industry.
Grades: 25% tannin; 50% total solids.
Containers: Tank cars; wooden barrels.
Uses: Tanning industry; core binder in foundries; road binder.
Railroad shipping regulations: None.*

Spurge Flax. See Mezereum.

Spurred Rye. See Ergot.

Squaw Bush. See Viburnum opulus.

Squaw Mint. See Hedeoma.

Squaw Root. See Caulophyllum.

Squaw Vine. See Mitchella.

Squill (Scilla; Sea onion).
Bulb of Urginea maritima, deprived of its dry, membranous, outer scales, cut into thin slices and carefully dried.
Habitat: Mediterranean basin near the sea (Spain, France, Italy, Morocco and Algeria).
Grades: U.S.P.
Containers: Bags.
Uses: Medicine (for its effect on the heart).
Railroad shipping regulations: None.*

Squirrel Corn. See Corydalis.

Stabilite. A proprietary name for diphenylethylenediamine used as a rubber antioxidant and age resister. It is a cream-colored powder with sp.gr. 1.15 and m.p. 140°C. Used generally for tire treads and sidewalls to prevent fatigue deterioration and absorption of accelerator by carbon black.

Stabilite Alba. A proprietary name for a compound stated to be di-ortho-tolylethylenediamine used as a rubber antioxidant and age resister. It is a reddish-brown powder having sp.gr. 1.12 and m.p. 60°C. It is used in light and bright-colored goods and white sidewalls of tires.

Stagbush. See Viburnum prunifolium.

Stainless. Ferrous alloys containing in addition to iron the following percentages of other metals: (a) Stainless A contains 14% chromium and 0.35% carbon. It is resistant to hot and cold concentrated nitric and acetic acids, hot and cold ammonium and sodium hydroxides in all concentrations and mine and sea waters. (b) Stainless B contains 16.5% chromium and 0.65% carbon. It offers similar resistance as the "A" alloy to the acid and alkalis, but is not resistant to mine and sea waters. (c) Stainless I contains 13.5% chromium and 0.1% carbon. It offers good resistance to all concentrations of hot and cold nitric and acetic acids, sodium and ammonium hydroxides and mine and sea water. (d) Stainless N contains 18% chromium, 8% nickel and 0.18% carbon. It is similar in resistance to Stainless I and also offers good resistance to moist sulfurous atmospheres and aqueous solutions of chlorine. (e) Stainless U contains 19% chromium, 9% nickel, 1% copper, 1% molybdenum and 0.2% carbon. It is resistant to all concentrations of hot and cold sulfuric acid, hydrochloric acid (except the boiling acid above 3%), nitric acid, acetic acid, and sodium hydroxide, to cold ammonium hydroxide and to mine and sea waters, moist sulfurous atmospheres and aqueous solutions of chlorine.

Stainless Irons. Trade designations for ferrous alloys which vary in composition and corrosion-resistant properties according to the chemical composition. The data concerning the products of three manufacturers are listed. (a) This alloy contains in addition to iron, 8% (and over) chromium, 0.4% manganese and less than 0.12% carbon. It offers good resistance to hot and cold nitric acid in all concentrations, very dilute and concentrated hot and cold acetic acid, hot and cold dilute sodium hydroxide, hot and cold ammonium hydroxide in all concentrations and mine and sea waters. (b) This alloy contains in addition to iron 16 to 17% chromium, 0.4% manganese and a maximum of 0.1% carbon. It is resistant to cold dilute and concentrated nitric acid and hot concentrated nitric acid, cold acetic acid in all concentrations, hot and cold sodium and ammonium hydroxides in all concentrations, and mine and sea waters. (c) This alloy contains 85 to 89% iron, 10 to 14% chromium, less than 0.5% manganese, less than 0.13% carbon. It offers good resistance to all concentrations of nitric acid in the cold and to cold dilute sodium and ammonium hydroxides, and mine and sea waters and moist sulfurous atmospheres.

Stainless Oils. One well-known oil is a compound of 40% neutral oil, 30% cottonseed oil, 20% olive oil and 10% first-pressing castor oil.
Railroad shipping regulations: None.*

Stainless Steels. Ferrous alloys which vary in composition and corrosion resistance properties according to the chemical composition. The data for the properties of the products of two manu-

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

facturers are listed. (a) This alloy contains in addition to the iron, 8% (and over) chromium, 0.4% manganese, less than 0.12% carbon. It is resistant to all concentrations of hot and cold nitric acid, acetic acid (except the hot concentrated acid), and to hot and cold dilute sodium hydroxide and cold concentrated sodium hydroxide, all concentrations of hot and cold ammonium hydroxide, mine and sea waters and moist sulfurous atmospheres. (b) This alloy contains in addition to the iron, 10% (or more) chromium, 0.5% manganese, 0.25% (or more) carbon. In hardened condition it is resistant to cold dilute nitric acid, cold concentrated acetic acid, sodium and ammonium hydroxides under all conditions, and sea water.

Standard White Oil. See Illuminating oils.

Standard Wood Spirits.
A purified methyl alcohol (q.v.), similar to Columbian spirits (q.v.).

Stannic Acid H_2SnO_3.
Color and properties: White powder.
Insoluble in water.
Derivation: A solution of stannic chloride is treated with ammonium hydroxide, a white gelatinous precipitate being formed. The precipitate loses water gradually until the dioxide remains.
Grades: Technical.
Containers: Barrels.
Uses: Preparation of tin salts; textile industry.
Railroad shipping regulations: None.*

Stannic Anhydride (Stannic oxide; Tin peroxide; Tin dioxide; Flowers of tin; Tin ash; Tin anhydride) SnO_2.
Color and properties: (a) White, amorphous powder. (b) White crystals.

Constants:	(a)	(b)
Specific gravity	6.6 to 6.9	6.7 to 6.85
Melting-point	1,127°C.	Infusible

Soluble in concentrated sulfuric acid and fused alkalis; insoluble in water.
Derivation: (a) Found in nature as the mineral cassiterite (q.v.). (b) Tin is melted and heated in air. (c) Tin ash, resulting from the oxidation of the baths of molten tin used in making tin plate, is refined.
Grades: White, pure; white; gray; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Tin salts; catalyst; ceramics (glazes); paints; putty; perfume preparations and cosmetics; textiles (mordant, weighting); polishing powder for steel, glass, etc., manufacture of milk-glass, alabaster glass, enamel and opaque glass.
Railroad shipping regulations: None.*

Stannic Chloride (Tin chloride; Tin tetrachloride; sometimes erroneously called Tin bichloride; Butter of tin; Tin "nitro and oxymuriate"; Tin oxymuriate) $SnCl_4$.
Color and properties: Colorless, fuming, caustic liquid, which water converts into the crystalline butter of tin, $SnCl_4.5H_2O$. Keep well stoppered.
Constants: Sp.gr. 2.2788; m.p. —33°C.; b.p. 114°C.
Soluble in cold water, alcohol, carbon bisulfide and oil of turpentine; decomposed by hot water.
Derivation: (a) Treatment of tin or stannous chloride with chlorine. (b) Tin is dissolved in concentrated hydrochloric acid, neutralized with soda, heated with concentrated hydrochloric acid and sodium chlorate.
Grades: Technical; C.P.
Containers: Various bottles; 560, 1,000 lb. drums.
Uses: Textile (mordant, weighting silk, brightening colors on wool, addition to sizing compounds for cotton warps to retard decomposition of the constituents of the size); manufacture of calomel; tinning vessels; manufacture of fuchsin; color lakes; ceramics; bleaching agent in the sugar industry; drug.
Railroad shipping regulations: White label.

Stannic Chromate (Tin chromate) $Sn(CrO_4)_2$.
Color and properties: Brownish-yellow, crystalline powder.
Soluble in water.
Derivation: By the action of chromic acid on stannic hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers. Glass bottles.
Uses: Decorating porcelain.
Railroad shipping regulations: None.*

Stannic Oxide. See Stannic anhydride.

Stannic Phosphide (Tin phosphide) Sn_2P_2.
Color and properties: Silver-white, hard mass or lumps.
Constants: Sp.gr. 6.56.
Soluble in acids.
Derivation: By heating tin and phosphorus.
Grades: Technical.
Containers: Iron drums.
Uses: Manufacture of phosphor-bronze.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label(?)*

Stannic Sulfide (Artificial gold; Mosaic gold; Tin bisulfide; Tin bronze; Tin disulfide) SnS_2.
Color and properties: Yellow, amorphous mass or scales.
Constants: Sp.gr. 4.42 to 4.60; m.p.: Decomposes at red-heat.
Soluble in concentrated hydrochloric acid and alkaline sulfides; insoluble in water.
Derivation: (a) By the action of sulfide on a solution of stannic chloride. (b) By heating tin amalgam with sulfur and ammonium chloride, distilling off the mercury sulfide and ammonium chloride.
Grades: Technical.
Containers. Glass bottles; boxes.
Uses: Imitation gilding.
Railroad shipping regulations: None.*

Stannite (Tin pyrites) (Cu,Sn,Fe)S, uncertain.
Color and properties: Steel-gray to nearly black mineral, metallic luster, often intermixed with yellow chalcopyrite (q.v.).
Soluble in nitric acid.
Constants: Sp.gr. 4.5 to 4.52; hardness 4.
Occurrence: United States (South Dakota), England, Germany, Bolivia.

Stannous Chloride (Tin crystals; Tin bichloride; Tin salt; Tin dichloride; Tin protochloride) (a) $SnCl_2$ (b) $SnCl_2.2H_2O$.
Color and properties: White, crystalline mass, which absorbs oxygen from the air, being converted into the insoluble oxychloride.

Constants:	(a)	(b)
Specific gravity	......	2.71
Melting-point	249.3°C.	37.7°C.
Boiling-point	603° to 628°C.	Decomposes

Soluble in water, alkalis, tartaric acid and alcohol.
Derivation: By dissolving tin in hydrochloric acid.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Reducing agent in manufacture of chemicals, intermediates, dyes, etc., manufacture of lakes; textiles (reducing agent in dyeing, mordant in cochineal dyeing, discharge in printing); tin galvanizing; reagent in analytical chemistry; medicine; removing ink stains; bleaching sugar; silvering mirrors; revivification of yeast sown in must (accelerator).
Railroad shipping regulations: None.*

Stannous Chromate (Tin chromate) $SnCrO_4$.
Color and properties: Brown powder.
Almost insoluble in water.
Derivation: By the interaction of stannous chloride and sodium chromate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Glass bottles.
Uses: Decorating porcelain.
Railroad shipping regulations: None.*

Stannous Oxalate (Tin oxalate) SnC_2O_4.
Color and properties: Heavy, white, crystalline powder.
Soluble in acids.
Derivation: By the action of oxalic acid on stannous oxide.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Dyeing and printing textiles.
Railroad shipping regulations: None.*

Stannous Oxide (Tin oxide; Tin protoxide) SnO.
Color and properties: Brownish-black powder; unstable in air.
Constants: Sp.gr. 6.3; m.p.: Decomposes with combustion.
Soluble in alcohol and ammonium chloride solution; insoluble in water and alkalis.
Derivation: By heating stannous hydroxide in a current of carbon dioxide.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Reducing agent.
Railroad shipping regulations: None.*

Stannous Sulfate (Tin sulfate) $SnSO_4$.
Color and properties: Heavy, white or yellowish, crystalline powder.
Constants: M.p.: Loses SO_2 at 360°C.
Soluble in water and sulfuric acid.
Derivation: By the action of sulfuric acid on stannous oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers. Wooden kegs.
Uses: Dyeing.
Railroad shipping regulations: None.*

Stannous Tartrate (Tin tartrate) $SnC_4H_4O_6$.
Color and properties: Heavy, white, crystalline powder.
Soluble in water.
Derivation: By the action of tartaric acid on stannous oxide.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyeing and printing fabrics.
Railroad shipping regulations: None.*

Stannum. The Latin name for tin, hence the symbol Sn in chemical nomenclature.

Staphisagria (Stave's acre; Delphinium).
Ripe seed of Delphinium staphisagria.
Habitat: Mediterranean basin and United States.
Grades: Technical.
Containers: Bags.
Uses: Medicine (ointment to destroy lice).
Railroad shipping regulations: None.*

Star Anise. See Ilicium.

Star Anise Oil. See Anise oil, star.

Star Flower. See Borage.

Star Grass. See Aletris.

Starch (Amylum; Maranta) $(C_6H_{10}O_5)$.
Color and properties: White, amorphous, tasteless powder or irregular lumps.
Constants: Sp.gr. 1.499 to 1.513; m.p.: Does not melt; b.p.: Decomposes (burns) when heated.
Insoluble in cold water, alcohol and ether; forms a jelly with hot water.
Derivation: From corn (maize), arrow-root, potatoes and the like; the material is rasped or ground with water, the resulting pulp is ground in the ordinary stone-mills, the milky liquid is strained through sieves, allowed to stand a short time to permit sand and the like to settle. The milk is then removed to another tank and the starch allowed to settle, the supernatant liquid removed and the starch washed a number of times and then dried.
Grades: Commercial; laundry; edible; U.S.P.
Varieties: Corn, wheat, rice, potato; tapioca, cassava or arrow-root; alant or inulin.
Containers. 140, 200, 280 lb. bags; barrels of various sizes.
Uses: Manufacture of adhesives; laundries; sizing and finishing textiles; foods (e.g., cocoas, chocolates, confectionery, ice cream, sausages, etc.); sizing paper; explosives; dextrin; reagent in analytical chemistry; medicine; face powders, cosmetics, etc.; bookbinding; distilled liquors; glucose; malt sugar; caramel; colloidal preparations; cattle foods.
Railroad shipping regulations: None.*

Starch Glazes.
Potato starch to which borax, powdered stearic acid, or paraffin has been added.

Starch Gum. See Dextrin.

Starch Nitrate. See Nitrostarch.

Starch, Soluble (Amylodextrin).
Color and properties: White powder.
Soluble in water.
Derivation: By heating starch with glycerol and adding strong alcohol during the cooling.
Grades: Technical.
Containers: Barrels, boxes, tins.
Uses: Emulsifying agent; textile industry.
Railroad shipping regulations: None.*

Starch Syrup. See Glucose.

Stassfurtite. See Boracite.

Staurolite.
A complex silicate mineral. The formula is usually given as
$HFeAl_5Si_2O_{13}$ or $Fe(AlO)_4(AlOH)(SiO_4)_2$,
sometimes with partial replacement of ferrous iron by magnesium and manganese and part of the aluminum by ferric iron. Color, yellowish-brown, reddish-brown grading to brownish-black, gray when weathered; streak, uncolored, white or grayish; subvitreous or resinous.
Constants: Sp.gr. 3.65 to 3.77; hardness 7 to 7.5.
Occurrence: United States (New Hampshire, Maine, Massachusetts, Connecticut, North Carolina, Georgia, Pennsylvania), Switzerland, Austria, France, Ireland, Germany, Brazil.
Uses: Of no great importance but sometimes the transparent varieties are used for gem stones.

Stave's Acre. See Staphisagria.

Steam-hammer Oils (Hammer oils).
A green, steam-refined cylinder stock, free of tar, and of the following constants is stated by one textbook to be suitable for this purpose: Gravity 25° to 26°Bé.; flash point 590° to 610°F.; fire test 680° to 710°F.; cold test 30°F.; Saybolt viscosity 220 to 245.
Railroad shipping regulations: None.*

Steapsin. See Enzymes.

Stearic Acid (Stearinic acid; Cetylacetic acid; Stearophanic acid) $CH_3(CH_2)_{16}CO_2H$.
Color and properties: Colorless, odorless, wax-like material.
Constants: Sp.gr. 0.847 (69.3°C.); m.p. 69.3°C.; b.p. 291°C.
Soluble in alcohol, ether, chloroform, carbon bisulfide, carbon tetrachloride; sparingly soluble in water.
Derivation: From high-grade tallows and yellow grease stearin by washing, saponifying with the Twitchell or similar reagent, sometimes under pressure, boiling, distilling, cooling and pressing; or from oleic acid by hydrogenation.
Method of purification: Crystallization.
Grades: Saponified; distilled; single-pressed; double-pressed; triple-pressed. (See approximate composition below.) U.S.P.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grade	Stearic Acid Per Cent	Oleic Acid Per Cent
Single-pressed	85	15
Double-pressed	90	10
Triple-pressed	95	5

Containers: 1, 5 lb. cans; 1 lb. cartons; barrels.

Uses: Manufacture of candles; stearates; pharmacy (glycerol suppositories); vanishing creams.

Railroad shipping regulations: None.*

Stearin (Tristearin; Glycerylstearic ester) $(C_{18}H_{35}O_2)_3C_3H_5$.

Color and properties: White, odorless, tasteless powder.

Constants: Sp.gr. 0.8621; m.p. 71° to 71.5°C.

Soluble in ether, chloroform and carbon bisulfide; very slightly soluble in alcohol; insoluble in water.

Derivation: Solid, natural, animal fats.

Grades: Technical.

Containers: 300 lb. wooden barrels.

Uses: Candles; soap; adhesive pastes; impregnating fabrics; textile size; leather stuffing; artificial ivory; metal polishes; water-proofing paper; water-proofing artificial stone.

Railroad shipping regulations: None.*

Stearic acid is often erroneously called stearin.

Stearin and Fatty Acid Pitches.

A series of pitches obtained as by-products from the following operations: (a) Soap and candle stock manufacture. (b) Refining of vegetable oils. (c) Refining of refuse greases. (d) Refining of wool grease.

These pitches are named by the source from which derived, e.g., stearin, candle-tar, candle, fat, bone-fat, cottonseed-oil, cotton-stearin, cottonseed-foots, corn-oil, corn-oil-foots, packing-house, garbage, sewage, wool, wool-grease, wool-fat, cholesterol, wool-stearin.

Color and properties: Dark brown to black; bright luster; fracture, none to conchoidal; fatty odor on heating, if heated with potassium acid sulfate yields odor of acrolein; contains 5 to 35% fixed carbon, 0 to 5% mineral matter, 0 to 5% carbenes and 0 to 5% sulfonation residue.

Solubility: 80 to 100% in 88° naphtha; 95 to 100% in carbon bisulfide.

Constants: Sp.gr. 0.90 to 1.10 (77°F.); fusing point 35° to 225°F. (K & S), 50° to 245°F. (B & R); volatile at 500°F. for 4 hrs. 0.5 to 7.5% (in nearly all cases a characteristic skin forms on the surface on heating); flash point 450° to 650°F.; saponification value 60 to 200; acid value (including lactone value) 2 to 100.

Uses: Manufacture of black paints and varnishes; tarred papers; printers' rolls; rubber filling agent; impregnating agent; ingredient of electrical insulations; marine caulking; waterproofing.

Railroad shipping regulations: None.*

Stearin Pitch. See Stearin and fatty acid pitches.

Stearinic Acid. See Stearic acid.

Stearophanic Acid. See Stearic acid.

Steatite. See Talc.

Steel. For data on various steels see Iron and steel (Ferrum).

Steel, Blister.

A term applied to the steel produced in the cementation process after its removal from the fire-brick chests. See also Iron and Steel.

Steel Blue. See Iron blues.

Steffens Molasses. See Molasses.

Steinbüller Yellow. See Chrome yellows.

Stellite. A non-ferrous alloy containing 40 to 80% cobalt, 0 to 25% tungsten, 20 to 35% chromium and 0.75 to 2.5% carbon. It is resistant to hot and cold nitric and acetic acids in all concentrations, hot and cold sodium and ammonium hydroxides, and to sea and mine waters.

Stenosine. See Disodium methyl arsenate.

Stephanite (Brittle silver ore) Ag_5SbS_4 or $5Ag_2S . Sb_2S_3$.

Color and properties: Soft, but brittle, iron-black mineral; streak same color; metallic luster. A natural silver sulfantimonite. Contains 68.5% silver, 15.2% antimony, 16.3% sulfur. Found with argentite, pyrargyrite and polybasite (q.v.).

Constants: Sp.gr. 6.2 to 6.3; hardness 2 to 2.5.

Occurrence: See Argentite, Pyrargyrite and Polybasite.

Uses: Ore of silver.

Sterculia Gum.

A series of gums obtained from the genus Sterculia found in India, Africa and Australia. They are similar to tragacanth gum in appearance but there is a variation in their properties. Some varieties have great adhesive qualities while others have great swelling power with water but poor adhesive qualities.

Uses: They have frequently been brought into commerce as tragacanth gum and have been used as such; fillers (ice cream) and stiffeners (jellies).

Sterling Nirosta Steel. A ferrous alloy containing in addition to iron 18% chromium, 8% nickel, 0.35% manganese, 0.15% carbon. It offers good resistance to all concentrations of cold and hot (not boiling) sulfuric acid (except the hot concentrated acid), all concentrations of hot and cold nitric acid, acetic acid, sodium hydroxide (except concentrated boiling), ammonium hydroxide and mine and sea waters and moist sulfurous atmospheres.

Sterling Stainless Steels. Ferrous alloys which contain in addition to iron the following percentages of other metals: (a) Sterling Stainless Steel A contains 13.5% chromium, 0.35% manganese, 0.35% carbon. (b) Sterling Stainless Steel B contains 16.5% chromium, 0.35% manganese, 0.65% carbon. Both these alloys offer good resistance to all concentrations of hot and cold nitric acid, acetic acid (not boiling), sodium hydroxide (not boiling concentrated), ammonium hydroxide and mine and sea waters. (c) Sterling Stainless Steel T contains 12.5% chromium, 0.35% manganese, 0.35% nickel and 0.12% carbon. It is resistant to all concentrations of cold and hot (not boiling) nitric and acetic acids, sodium and ammonium hydroxides (the dilute alkalis may be boiling) and mine waters.

Stibiconite. See Antimony ocher.

Stibium. The Latin name for the elementary metal antimony, hence the symbol Sb in chemical nomenclature.

Stibnite (Gray antimony; Antimony glance; Antimonite) Sb_2S_3, sometimes contains silver or gold.

Color and properties: Lead-gray mineral inclining to steel-gray, subject to blackish tarnish; metallic luster. Differs from galenite and other sulfides by ease of fusion and cloud-like fumes. Contains 71.8% antimony, 28.2% sulfur. Soluble in concentrated boiling hydrochloric acid with evolution of H_2S.

Constants: Sp.gr. 4.52 to 4.62; hardness 2.

Occurrence: United States (Arkansas, Alaska, California, Nevada), Germany, Hungary, France, Japan, China, Mexico, Chile.

Uses: The most important ore of antimony.

Stick.

A liquor obtained when slaughter-house tankage and garbage tankage are steam-cooked under pressure. When evaporated it contains about 35 to 45% water and about 2 to 12% ammonia.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Mixed and dried with such materials as low-grade tankage or garbage tankage. Sometimes used in manufacturing base goods (q.v.).

Stick Lac. See Shellac.

Stilbene (Toluylene; Diphenylethylene) $C_6H_5CHCHC_6H_5$.
Color and properties: Colorless or slightly yellow crystals.
Constants: Sp.gr. 0.9707; m.p. 124° to 125°C.; b.p. 306° to 307°C.
Soluble in benzene and ether; slightly soluble in alcohol; insoluble in water.
Derivation: By passing toluene over hot lead oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden casks.
Uses: Manufacture of dyes.
Railroad shipping regulations: None.*

Stilbite. See Zeolites.

Stillingia (Queen's root; Yaw root; Silver leaf).
Root of Stillingia sylvatica.
Habitat: Southeastern United States.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (of doubtful value).
Railroad shipping regulations: None.*

Stillingia Oil (Tallow-seed oil).
Color and properties: Pale yellow, limpid, drying oil; peculiar odor like linseed oil; mustard-like taste.
Constants: Sp.gr. 0.9432 to 0.9458; iodine number 160; saponification number 210.
Slightly soluble in alcohol.
Derivation: From the seeds of the tallow tree, Stillingia sebifera, by pressing.
Grades: Technical.
Containers: 375 lb. barrels; 8,000 gal. tank cars.
Uses: Candles; soap; dressing textiles.
Railroad shipping regulations: None.*

Stinkweed. See Stramonium.

Stitching Oil.
A lubricant used for facilitating the stitching of shoes.
Grades: Water white; fine white; light straw.

Stockholm Tar. See Tar, pine.

Stolzite $PbWO_4$.
Color and properties: Green to gray or brown or reddish-yellow mineral.
Constants: Sp.gr. 7.87 to 8.13; hardness 3.
Occurrence: United States (Massachusetts), Bohemia, Australia, Sardinia, Chile, Brazil.

Stone Green.
A mixture of a ground green earth and a white clay.
Uses: Ingredient of water-proofing paints.

Stone Red.
A fine red pigment consisting, essentially, of red iron oxide. See also: Ferric oxide, red and Hematite, red.

Stoneware Clay. See under Clays.

Storax. See Styrax.

Storax Oil. See Styrax oil.

Storksbill. See Geranium.

Stovaine (Benzoyldimethylaminoethylpropanol hydrochloride; Dimethylaminoethylpropylbenzoate hydrochloride)
$CH_3CH_2CC_6H_5COOCH_3CH_2N(CH_3)_2HCl$.
Color and properties: Small, brilliant scales. Decomposed by very dilute alkalis. Approximately one-half as toxic as cocaine but more toxic than eucaine.
Constants: M.p. 175°C.
Soluble in water.
Uses: Medicine (more powerful local anesthetic than cocaine, unofficial).

Stovarsol. See Acetylaminohydroxyphenylarsonic acid.

Stramonium (Jamestown weed; Jimson weed; Thorn apple; Stinkweed; Devil's apple; Apple of Peru).
Derivation: Dried leaves and flowering tops of Datura stramonium.
Habitat: Europe, Asia and America.
Grades: Technical, U.S.P.
Containers: 200 lb. bales; bales of various sizes.
Uses: Medicine (similar to belladonna).
Railroad shipping regulations: None.*

Straphanthin.
Color and properties: Poisonous white or yellowish powder; mixture of glucosides.
Soluble in water and dilute alcohol.
Derivation: Extraction from strophanthus.
Grades: U.S.P.
Uses: Medicine (for its influence upon the circulation).
Railroad shipping regulations: None.*

Straus Metal. A trade name for cemented tungsten carbide (q.v.).

Strawberry Aldehyde. See Hexadecyl aldehyde.

Strawberry Tree. See Euonymus.

Striped Alder. See Hamamelis.

Stromeyerite (Argentiferous copper-glance; Argentocuprous sulfide) $(Ag,Cu)_2S$ or $Ag_2S.Cu_2S$.
Color and properties: Sectile, dark steel-gray mineral, streak same color, metallic luster. A natural sulfide of copper and silver somewhat variable in composition. Resembles chalcocite (q.v.).
Constants: Sp.gr. 6.15 to 6.3; hardness 2.5 to 3.
Occurrence: United States (Arizona, Nevada, California, Colorado), Siberia, Germany, Chile, Mexico, Canada, Peru, Tasmania, Argentine.

Strontianite $SrCO_3$.
A pale yellowish, greenish-white or green, gray or colorless mineral; vitreous luster, white streak. It is a natural strontium carbonate containing 70.1% SrO, sometimes with some calcium.
Constants: Sp.gr. 3.68 to 3.72; hardness 3 to 3.5.
Occurrence: United States (New York), Westphalia (chief source), Canada.
Uses: Preparation of strontium chemicals.

Strontium Sr.
Color and properties: Pale, yellow, soft metal, similar to sodium. Must be kept immersed in naphtha. Occurs in nature in the minerals strontianite (carbonate), brewsterite (silicate) and celestite (sulfate).
Constants: Sp.gr. 2.54; m.p. 900°C.; b.p.: Burns when heated in air above melting-point.
Soluble in alcohol and acids; decomposes water on contact.
Derivation: By electrolysis of molten strontium chloride in a graphite crucible with cooling of the upper, cathodic space.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label(?)*

Strontium Acetate $Sr(C_2H_3O_2)_2 . \frac{1}{2}H_2O$.
Color and properties: White crystalline powder.
Soluble in water.
Grades: C.P.
Containers: 1 lb. bottles.
Uses: Medicine (intestinal vermifuge, unofficial).
Railroad shipping regulations: None.*

Strontium-alpha-phenylcinchoninate (Iriphan; Triphan).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

A yellowish-white crystalline powder used in medicine (diuretic, rheumatism, gout, unofficial).
Railroad shipping regulations: None.*

Strontium Arsenite $Sr(AsO_2)_2.4H_2O$.
Color and properties: White powder.
Slightly soluble in water.
Uses: Medicine (alterative, unofficial).
Railroad shipping regulations: Class B poison.

Strontium Bromide $SrBr_2$.
Color and properties: White, hygroscopic crystals or powder. Keep well stoppered.
Constants: Sp.gr. 4.216; m.p.: Above 630°C.; b.p.: Decomposes.
Soluble in water, alcohol and amyl alcohol.
Derivation: A strontium carbonate is treated with bromine or hydrobromic acid in presence of a reducing agent.
Method of purification: Recrystallization.
Grades: Anhydrous powder; crystal; technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. boxes; 100, 112 lb. cases; 100 lb. kegs; 275 lb. barrels.
Uses: Medicine (similar to potassium bromide).
Railroad shipping regulations: None.*

Strontium Carbonate $SrCO_3$.
Color and properties: White, impalpable powder.
Constants: Sp.gr. 3.62; m.p.: Decomposes at about 1,075°C.; b.p.: Loses CO_2 at 1,340°C.
Soluble in alcohol, acids, carbonated water and solutions of ammonium salts; very slightly soluble in water.
Derivation: Celestite is boiled with a solution of ammonium carbonate or is fused with sodium carbonate.
Method of purification: Ignition to pale red-heat.
Grades: Pure; precipitated; technical; C.P.; N.F.
Containers: 1, 5 lb. bottles; 1, 5 lb. cans; 25, 50 lb. boxes; 100 lb. cases; 100 lb. kegs; 250, 600 lb. barrels.
Uses: Pyrotechnics; manufacture of iridescent glass; strontium salts.
Railroad shipping regulations: None.*

Strontium Chlorate (a) $Sr(ClO_3)_2$ (b) $Sr(ClO_3)_2.8H_2O$.
Color and properties: White, crystalline powder. Must not be triturated with organic materials, liable to cause explosions.
Constants: (a) Sp.gr. 3.152; m.p.: Decomposes at 290°C.
Soluble in water; slightly soluble in alcohol.
Derivation: Strontium hydroxide solution is warmed and chlorine passed in, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Manufacture of red-fire and other pyrotechnics.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Strontium Chloride (a) $SrCl_2$ (b) $SrCl_2.6H_2O$.
Color and properties: White, crystalline needles; sharp, bitter taste.

Constants:	(a)	(b)
Specific gravity	3.054	1.964
Melting-point	872°C.	Loses $6H_2O$ at 112°C.

Soluble in water and alcohol.
Derivation: Strontium carbonate is fused with calcium chloride, the melt extracted with water, the solution concentrated and crystallized.
Method of purification: Recrystallization.
Impurities: Lime.
Grades: Pure crystal or dried; highest purity, crystal; technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Strontium salts; pyrotechnics; medicine.
Railroad shipping regulations: None.*

Strontium Dioxide. See Strontium peroxide.

Strontium Hydrate. See Strontium hydroxide.

Strontium Hydroxide (Strontium hydrate) (a) $Sr(OH)_2$ (b) $Sr(OH)_2.8H_2O$.
Color and properties: Colorless, deliquescent crystals.
Constants: Sp.gr. (a) 3.625; (b) 1.396. M.p. (a) 375°C.
Soluble in acids and hot water; slightly soluble in cold water.
Derivation: (a) Strontianite is converted into the oxide by ignition, the latter slaked with water. (b) Celestite is fused with sodium carbonate under pressure, and the carbonate formed is extracted with water, evaporated to dryness and ignited as above.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Sugar industry.
Railroad shipping regulations: None.*

Strontium Iodide (a) SrI_2 (b) $SrI_2.6H_2O$.
Color and properties: (a) White, crystalline plates; decomposes in moist air. Keep well stoppered. (b) White crystals.

Constants:	(a)	(b)
Specific gravity	4.549	4.415
Melting-point	507°-645°C.	....
Boiling-point	Decomposes	....

Soluble in water.
Derivation: By treating strontium carbonate with hydriodic acid.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: 1, 5 lb. bottles; 25 lb. jars; 100 lb. kegs.
Uses: Medicine.
Railroad shipping regulations: None.*

Strontium Lactate $Sr(C_3H_5O_3)_2.3H_2O$.
Color and properties: White crystals or granular powder.
Soluble in water, alcohol.
Grades: U.S.P.
Containers: 1 lb. bottles.
Uses: Medicine (in treatment of rheumatism and gout, unofficial).
Railroad shipping regulations: None.*

Strontium Nitrate (a) $Sr(NO_3)_2$ (b) $Sr(NO_3)_2.4H_2O$.
Color and properties: White powder.

Constants:	(a)	(b)
Specific gravity	2.98	2.249
Melting-point	645°C.	....

Soluble in water; very slightly soluble in absolute alcohol; insoluble in nitric acid and dilute alcohol.
Derivation: A concentrated solution of strontium chloride is precipitated by means of sodium nitrate.
Method of purification: Recrystallization.
Grades: Pure dry; dry; impalpable powder; technical; C.P.
Containers: 1, 5 lb. bottles; 25, 50 lb. boxes; 200 lb. bags; 100, 220 lb. kegs; 600, 650 lb. barrels; 700 lb. casks.
Uses: Pyrotechnics, marine signals, railroad flares; matches.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Strontium Peroxide (Strontium dioxide) (a) SrO_2 (b) $SrO_2.8H_2O$.
Color and properties: White powder.
Constants: Sp.gr.: (a) 0.456. M.p.: (a) Decomposes; (b) Loses $8H_2O$ at 100°C. and decomposes when heated to a higher temperature.
Soluble in alcohol and ammonium chloride solution; decomposes in hot water.
Derivation: By passing oxygen over heated strontium oxide.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Tins.
Uses: Bleaching.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Strontium Phosphate $Sr_3(PO_4)_2$.
Color and properties: White tasteless powder. Insoluble in water.
Grades: C.P.; U.S.P.
Containers: 1 lb. bottles.
Uses: Medicine (tissue builder, unofficial).
Railroad shipping regulations: None.*

Strontium Salicylate $Sr(C_7H_5O_3)_2.2H_2O$.
Color and properties: White crystals or powder.
Soluble in water and alcohol.
Decomposes when heated.
Derivation: By the interaction of strontium carbonate and salicylic acid.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: 1 lb. bottles; 5, 25 lb. cans; 112, 224 lb. cases; 100 lb. kegs; 200 lb. barrels.
Uses: Medicine (treating rheumatic affections).
Railroad shipping regulations: None.*

Strontium Sulfate $SrSO_4$.
Color and properties: White precipitate or crystals of the mineral celestite.
Constants: Sp.gr. 3.71 to 3.97; m.p. 1,605°C.; b.p.: Decomposes at white-heat.
Slightly soluble in concentrated acids; very slightly soluble in water; insoluble in alcohol and dilute sulfuric acid.
Derivation: (a) Celestite is ground; (b) Precipitation of any soluble strontium salt by means of sodium sulfate.
Method of purification. Washing with water.
Impurities: Sodium sulfate.
Grades: Commercial; free from sodium salts; C.P.
Containers: 1, 5 lb. bottles; wooden kegs.
Uses: Pyrotechnics.
Railroad shipping regulations: None.*

Strophanthin.
Color and properties: White or yellowish powder. Poisonous!
Soluble in water and dilute alcohol.
Derivation: By alcoholic extraction from ground Strophanthus which has previously been treated to remove its oil.
Grades: U.S.P.
Containers: ⅛, ¼, ½, 1 oz. vials; 15, 5 gr. vials.
Uses: Medicine (treating circulatory failure).

Strophanthus.
Ripe seeds of Strophanthus kombe or hispidus.
Habitat: Central Africa, Asia, Philippines.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (influence on the circulation).
Railroad shipping regulations: None.*

Strychnina, U.S.P. See Strychnine.

Strychnine $C_{21}H_{22}N_2O_2$.
Color and properties: Hard, white, crystalline alkaloid; very bitter taste; very poisonous!
Constants: M.p. 268°C.
Soluble in chloroform; slightly soluble in alcohol and benzene; very slightly soluble in water and ether.
Derivation: By extraction of the seeds of Nux vomica with acetic acid, filtration, precipitation by alkali and filtration.
Method of purification: Recrystallization.
Grades: Crystal; powder; N.F.; U.S.P. (hydrochloride, nitrate, sulfate); technical.
Containers: 1/16, ⅛, ¼, ½, 1 oz. vials; 1, 4, 5, 10, 16, 25, 50, 100 oz. tins.
Uses: In medicine as such, or as the hydrochloride, bisulfate, lactate, nitrate, sulfate or other salt, which are more soluble in water, as stimulants to the nervous system.
Railroad shipping regulations: None.*

Stypticin. See Cotarnine hydrochloride.

Styptol. Cotarnine phthalate used in medicine for the treatment of uterine hemorrhages (menorrhagia, metorrhagia) but not useful for other hemorrhages.
Railroad shipping regulations: None.*

Styracin. See Cinnamyl cinnamate.

Styracol (Guaiacol cinnamate) $C_6H_5CHCHCOO(C_6H_4OCH_3)$.
Color and properties: White needles, tasteless, odorless.
Constants: Fusing point 130°C.
Soluble in alcohol, acetone, benzene, chloroform; almost insoluble in water.
Uses: Medicine (internal antiseptic, phthisis, chronic gastrointestinal and genito-urinary catarrhs, unofficial).
Railroad shipping regulations: None.*

Styrax (Storax; Oriental sweet gum; Liquid amber orientalis).
Color and properties: (a) Amber-colored droplets or powder. (b) Thick, tough, gray, semi-liquid mass.
Chief constituents: Storesin; cinnamic acid and esters.

Constants:	(a)	(b)
Specific gravity	0.890 to 1.100	....
Boiling-point	150° to 300°C.	....
Optical rotation	—3 to —38	....

Soluble in ether, acetone, carbon bisulfide, and warm alcohol, some residue usually remaining.
Derivation: A balsam obtained from the inner bark of Liquidambar orientalis; habitat: Asia Minor.
Method of purification. Solution in ether and treatment with fused calcium chloride.
Grades: Technical; U.S.P.
Containers: 1, 5, 10 lb. bottles; 40, 50, 60 lb. tins; 90 lb. cases.
Uses: Medicine (stimulating expectorant and feeble antiseptic); microscopy; fumigating powders and tablets; perfumery; source of styrene.
Railroad shipping regulations: None.*

Styrax Oil (Storax oil).
Color and properties: Pale yellow, liquid, volatile oil.
Chief known constituents: Styrol; cinnamic acid esters.
Constants: Sp.gr. 0.890 to 0.900; b.p. 150° to 300°C., with decomposition; optical rotation —15°.
Derivation: By distillation from styrax.
Grades: Technical.
Containers: Glass bottles.
Uses: Perfumery.
Railroad shipping regulations: None.*

Styrene (Styrol; Phenylethylene; Styrolene; Cinnamene; Cinnamol; Cinnamenol; Vinylbenzene) $C_6H_5CHCH_2$.
Color and properties: Highly refractive, yellowish, oily liquid; aromatic odor.
Constants: Sp.gr. 0.9121; b.p. 146°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: From liquid styrax.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Styrol. See Styrene.

Styrolene. See Styrene.

Styrolene Acetate.
Color and properties: Colorless liquid, odor of hyacinth and jasmine.
Derivation: Natural in gardenia oil.
Uses: Perfumery.
Railroad shipping regulations: None.*

Styrone. See Cinnamyl alcohol.

Styrylic Alcohol. See Cinnamyl alcohol.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Suakin Gum. See Arabic gum.

Subcutin.

Color and properties: White crystalline powder. Sparingly soluble in cold water, slightly more so in tepid water.

Derivation: A compound of para-phenolsulfonic and para-aminobenzoic acids.

Uses: Medicine (non-toxic, germicidal, mild local anaesthetic, unofficial).

Sublamine (Hydrargyri sulphas aethylenediaminata; Ethylene diamine mercury sulfate) $HgSO_4.2C_2H_4(NH_2).2H_2O$.

Color and properties: White powder. Contains approximately 43% mercury. Incompatible with sodium chloride. Do not expose to air.

Soluble in water.

Uses: Medicine (non-irritant germicide for disinfecting hands and skin, hypodermic treatment of syphilis, unofficial).

Railroad shipping regulations: None.*

"Sublimate." See Mercuric chloride.

Sublimate, Corrosive. See Mercuric chloride.

Succinic Acid (Ethylenesuccinic acid; Ethylenedicarboxylic acid) $CO_2H(CH_2)_2CO_2H$.

Color and properties: Colorless crystals.

Constants: Sp.gr. 1.552; m.p. 185°C.; b.p. 235°C.

Soluble in water; sparingly soluble in alcohol and ether.

Derivation: By the fermentation of ammonium tartrate.

Method of purification: Crystallization.

Grades: Technical; C.P.

Containers: 1 lb. bottles; wooden barrels; kegs.

Uses: Medicine; organic synthesis.

Railroad shipping regulations: None.*

Succinonitrile. See Ethylene cyanide.

Succinylsalicylic Acid. See Diaspirin.

Succus. In medicine, expressed juice of fresh plants, preserved by the addition of one-third of their bulk of alcohol.

Sucrase. See Convertit.

Sucrol. See Dulcin.

Sucrose. Pure sugar. See Sugar, cane and beet.

Sudan Gum. See Arabic gum.

Sudan Red III. See Aminoazobenzene-beta-naphthol.

Suet, Benzoinated. Suet containing benzoin, with which it has been heated at a temperature not exceeding 60°C. The benzoin retards rancidity and imparts a pleasant odor to the suet. In hot climates a portion of the suet may be replaced by an equal weight of white wax.

Grades: U.S.P.

Uses: Medicine.

Railroad shipping regulations: None.*

Sugar, Acorn. See Quercitol.

Sugar, Beet. See Sugar, cane and beet.

Sugar, Burnt. See Caramel.

Sugar, Cane and Beet (Saccharose; Saccharum; Sucrose) $C_{12}H_{22}O_{11}$.

Color and properties: Hard, white, dry crystals, lumps or powder; sweet taste.

Constants: Sp.gr. 1.5877; m.p. 189.2°C.; b.p.: Burns.

Soluble in water; very slightly soluble in alcohol.

Derivation: By crushing and extraction of sugar-cane with water (Saccharum officinarum) or extraction of the sugar-beet (Beta vulgaris) with water, evaporating and purifying.

Method of purification: Treatment of solution with lead acetate, filtration, concentration, crystallization and coloring with ultramarine.

Grades: Cube, lump or cut: White granular sugar molded or cut into cubes.

Powdered, iceing and bar sugars made by grinding coarse granulated sugar into fine particles and then separating these particles by screening them through fine silk cloth. Starch is sometimes added to powdered sugar to prevent it from caking.

Bar sugar: A grade of sugar used in the preparation of beverages.

Brown and yellow sugars, or "softs" as they are usually called, comprise fifteen grades, ranging in color from creamy white to a dark brown. These sugars are used chiefly by bakers in making ginger-bread, pies and cakes, although a small quantity finds its way directly into households for ordinary domestic consumption. The characteristics of yellow sugars are that they have a small grain and contain a sufficient amount of molasses to make them moist to the touch, properties brought about by a radically different method of boiling from that applied to white sugars. They also contain a certain amount of invert sugar which preserves the softness of grain and prevents subsequent caking or hardening.

White, confectioner's or granulated sugar, obtained by thorough bleaching and filtration of crude or raw sugars and subsequent crystallization. The grades vary in accordance with the size of the crystals which is regulated by the conduct of the final stages of the process of evaporation. Demerara yellow is a yellow colored granulated sugar quite extensively used in Europe for household purposes.

Loaf sugar: Granulated sugar molded into large, tall cones, which are broken up as needed. The form in which all sugar formerly came into the household; still in considerable use in Europe.

Containers: 1, 5 lb. bottles; barrels; bags; cardboard boxes.

Uses: Food; sweetening; manufacture of syrups; confectionery; preserves and jams; demulcent and lenitive; soap; pharmaceutical products; caramel.

Railroad shipping regulations: None.*

Sugar, Corn. See Dextrose.

Sugar, Grape. See Dextrose.

Sugar Coloring. See Caramel.

Sugar of Lead. See Lead acetate.

Sugar of Milk. See Lactose.

Sugars. See specific sugar.

Sulfanilic Acid (Para-aminobenzenesulfonic acid; Para-anilinesulfonic acid) $C_6H_4NH_2.SO_3H$.

Color and properties: Grayish-white, flat crystals.

Constants: M.p.: Chars at 280°C.

Soluble in fuming hydrochloric acid; slightly soluble in water; very slightly soluble in alcohol and ether.

Derivation: By heating aniline with weak fuming sulfuric acid and pouring the reaction product into water.

Method of purification: By boiling a solution of the sodium salt with animal charcoal.

Grades: Technical; pure; C.P.

Containers: 1, 5 lb. bottles; 100 lb. kegs; 400, 450 lb. wooden barrels or drums.

Uses: Dyestuffs; organic synthesis.

Railroad shipping regulations: None.*

Sulfanilic Acid, Meta-. See Metanilic acid.

Sulfarsenol. See Sulfarsphenamine.

Sulfarsphenamine (3:3-Disodium-4:4-diaminodihydroxyarsenobenzene-N-dimethylenesulfonate; Sulfarsenol).
$NaOSO_2CH_2NHOHC_6H_3As:AsC_6H_3OHNHCH_2OSO_2Na$.

Color and properties: Orange-yellow powder possessing an odor resembling that of sulfur dioxide and arsine. Must not contain less than 19% of arsenic.

Readily soluble in water yielding a yellow solution which is acid to litmus paper.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Synthetic.
Method of purification: Precipitation.
Grades: N.N.R.
Containers: Ampules.
Uses: Medicine (specific drug in syphilis).
Railroad shipping regulations: None.*

Sulfate Pulp. See Paper pulp.

Sulfethylic Acid. See Ethylsulfuric acid.

Sulfidal. See Sulfur, colloidal.

Sulfite Acid Liquor. An aqueous solution of calcium bisulfite or calcium and magnesium bisulfites, containing a large amount of free sulfur dioxide. It is prepared from sulfur dioxide and limestone or dolomite or lime. Used in the manufacture of sulfite pulp in the paper industry.

Sulfite Pulp. See Paper pulp.

Sulfite Waste Liquor.
A waste liquor produced in the sulfite process of making paper. Sold in three forms, (a) Dilute. (b) Concentrated. (c) Solid.
Color and properties: (a) Light brown liquid. (b) Dark brown viscous liquid. (c) Brown granular solid.
Constants: (a) 10% total solids. (b) 50 to 52% solids; gr. 30° to 35°Bé.
Derivation: (a) Neutralized with lime or soda. (b) Neutralized and evaporated to 30°Bé. (c) Neutralized and evaporated to dryness.
Containers: (a) Drums; carboys. (b) Drums; barrels. (c) Bags; barrels.
Uses: (a) Emulsifier; foam producer. (b) Emulsifier; binder for briquettes; adhesive; tanning agent. (c) Core binder.
Railroad shipping regulations: None.*

Sulfoarsenious Anhydride. See Orpiment.

Sulfobenzeneazodimethylaniline. See Dimethylaminoazobenzene sulfonate.

Sulfobenzoic Acid, Ortho- $HSO_3C_6H_4COOH$.
Color and properties: White needles.
Constants: M.p. 68° to 69°C. (with $3H_2O$ of crystallization); m.p. 134°C. (dry).
Soluble in water and alcohol; insoluble in ether.
Derivation: (a) From saccharin by heating with ten parts of water and three parts of concentrated hydrochloric acid, evaporating this solution to small volume and thereby obtaining acid ammonium salt of ortho-sulfobenzoic acid. This is dissolved in water and barium hydroxide is added to precipitate the barium salt. The excess of barium is precipitated with carbon dioxide and the barium salt of ortho-sulfobenzoic acid is decomposed with sulfuric acid. Ortho-sulfobenzoic acid is obtained by concentrating the filtrate. (b) By the oxidation of thiosalicylic acid with potassium permanganate in alkaline solution.
Method of purification: Crystallization from water.
Containers: Glass bottles.
Uses: Manufacture of sulfonephthalein indicators, dyes.
Railroad shipping regulations: None.*

Sulfobenzoic Acid Chloride, Ortho- (Symmetrical) $SO_3ClC_6H_4COCl$.
Color and properties: White crystals.
Constants: M.p. 79°C.
Derivation: From ortho-sulfobenzoic acid by treating with PCl_5, whereby a mixture of symmetrical and unsymmetrical chlorides are obtained. Separation by fractional crystallization. (Difficult).
Containers: Glass bottles.
Uses: Production of symmetrical esters of ortho-sulfobenzoic acid.
Railroad shipping regulations: None.*

Sulfobenzoic Acid Chloride, Ortho- (Unsymmetrical) $C_6H_4Cl_2COSO_2$.
Color and properties: White crystals.
Constants: M.p. 40°C.
Derivation: Same as symmetrical (q.v.).
Uses: Manufacture of sulfonephthalein indicators.
Railroad shipping regulations: None.*

1: 4-Sulfo-2: 3-dichlorophenyl-3-methylpyrazolone $C_{10}H_8O_4N_2Cl_2S$.
Color and properties: White or yellowish powder or crystals.
Very soluble in water; soluble in alkalis.
Derivation: By condensation of dichlorophenylhydrazine sulfonic acid with ethylacetoacetate.
Method of purification: Crystallization.
Grades: Technical; C.P.
Uses: Intermediate for dyes.
Railroad shipping regulations: None.*

Sulfonal (Sulfone methane; Diethylsulfone dimethylmethane) $(CH_3)_2C(SO_2C_2H_5)_2$.
Color and properties: Colorless, crystalline powder.
Constants: M.p. 125° to 126°C.; b.p.: Decomposes at 300°C.
Soluble in alcohol, ether, chloroform, benzene; slightly soluble in water.
Derivation: Anhydrous acetone and anhydrous ethylmercaptan are combined by means of a stream of anhydrous hydrochloric acid, and the upper layer of the resulting liquid is oxidized with potassium permanganate.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: Glass bottles; 1 lb. cartons.
Uses: Medicine (sleep producer).
Railroad shipping regulations: None.*

Sulfonated Castor Oil. See Turkey red oil.

Sulfonedichloraminobenzoic Acid, Para-. See Helazone.

Sulfoneëthylmethane (Trional; Diethylsulfonemethylethylmethane) $CH_3(C_2H_5)C(SO_2C_2H_5)_2$.
Color and properties: Colorless, lustrous, crystal or powder; odorless; characteristic, slightly bitter taste.
Constants: M.p. 76°C.
Soluble in water, alcohol and ether; moderately soluble in water.
Derivation: By passing dry hydrochloric acid gas into a mixture of anhydrous ethyl mercaptan and methylethyl ketone and oxidizing the product with potassium permanganate.
Method of purification: Crystallization.
Grades: Technical; U.S.P.
Containers: 1 lb. bottles; 5, 25 lb. boxes; 50 lb. kegs.
Uses: Medicine (as a sleep producer).
Railroad shipping regulations: None.*

Sulfonemethane. See Sulfonal.

1-Sulfophenyl-3-methyl-5-pyrazolone, Para- $C_{10}H_{10}O_4N_2S$.
Color and properties: White or yellowish powder.
Only very slightly soluble in water; soluble in alkalis.
Derivation: By condensation of phenylhydrazine sulfonic acid with ethylacetoacetate.
Method of purification: Crystallization.
Grades: Technical; C.P.
Uses: Intermediate for dyes.
Railroad shipping regulations: None.*

Sulfosalicylic Acid $C_6H_3OHSO_2OHCOOH$.
Color and properties: Colorless crystals.
Constants: M.p. 120°C.
Very soluble in water.
Derivation: Action of sulfuric acid on salicylic acid.
Method of purification: Recrystallization.
Grades: C.P.; analytical.
Containers: Glass bottles.
Uses: Reagent for albumin.
Railroad shipping regulations: None.*

Sulfourea. See Thiocarbamide.

Sulfovinic Acid. See Ethylsulfuric acid.

Sulfovinous Acid. See Ethylsulfurous acid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Sulfur (Brimstone; Flowers of sulfur; Sulfur flour) S.

Color and properties: (a) Amorphous soft; (b) Hard yellow.

Found native in Alabama, California, Colorado, Georgia, Idaho, Kentucky, Louisiana, Nevada, New Mexico, Tennessee, Texas, Utah and Wyoming, and Sicily.

Constants:	(a)	(b)
Specific gravity	1.9556	2.046
Melting-point	About 120°C.	....
Boiling-point	444.6°C.	444.6°C.
Ignition-point	....	255°C.

Soluble in carbon bisulfide and sulfur chloride; insoluble in water.

Derivation: Mined as such or molten underground by superheated water, pumped up and allowed to solidify in bins from which it is shipped.

Method of purification: Precipitation or sublimation.

Grades of the hard variety: Crystals; crude (brimstone); roll; precipitated, pure; milk of sulfur; sublimed (flowers of sulfur); washed; U.S.P.; flour.

Containers: U. S. P.: 1 lb. cartons; bulk in carloads; brimstone: 250 lb. bags; flour: 100, 150 lb. bags; 240, 260, 290 lb. barrels; flowers: 240 lb. barrels; lac: 125 lb. barrels; roll: 350, 500 lb. barrels.

Uses: Gunpowder; pyrotechnics; matches; sulfuric and sulfurous acids; various organic and inorganic chemicals; paper; sulfurizing wine and beer vats; making casts and molds; pharmacy; bleaching; medicine; disinfectant (by burning) and vermin destroyer; rubber industry; lime-sulfur solutions; acid-resistant cements; cattle feeds; photographic reagent; plastics.

Fire hazard: Dangerous.*

Railroad shipping regulations: None.*

Sulfur Balsam. Sulfuretted linseed oil, obtained by boiling linseed oil with sulfur.

Sulfur Bichloride. See Sulfur dichloride.

Sulfur Chloride (Sulfur subchloride) S_2Cl_2.

Color and properties: Amber to yellowish-red, oily, fuming liquid; penetrating odor; irritating effect on the eyes, lungs and mucous membranes. Keep well stoppered.

Constants: Sp.gr. 1.7094; m.p. −80°C.; b.p. 138°C.

Soluble in alcohol, ether, benzene, carbon bisulfide and amyl acetate; decomposes on contact with water.

Derivation: By passing chlorine over molten sulfur.

Method of purification: Distillation.

Grades: Technical.

Containers: 25, 50, 75 lb. jugs; 150 lb. carboys; 700 lb. drums.

Uses: Chemicals (sulfur solvent, acetic anhydride, thionyl chloride, carbon tetrachloride from carbon bisulfide, various chlorohydrins from glycerol, glycol, etc.); analytical reagent; rubber industry for vulcanizing; manufacturing vulcanized oils; rubber substitutes and cements; purifying sugar juices; manufacture of military poison gas; insecticides; hardening soft woods (by treatment with sulfur chloride dissolved in carbon bisulfide); pharmaceuticals; textile finishing and dyeing; extraction of gold from its ores.

Railroad shipping regulations: White label.

Sulfur, Colloidal (Sulphoid; Sulfidal). A colloidal form of sulfur produced by passing hydrogen sulfide through a solution of sulfurous acid. Used in medicine in the treatment of skin diseases. Unofficial.

Railroad shipping regulations: None.*

Sulfur Dichloride (Sulfur bichloride) SCl_2.

Color and properties: Reddish-brown liquid.

Constants: Sp.gr. 1.622; m.p. −78°C.; b.p. 59°C.; decomposes at 64°C.

Decomposes in water.

Derivation: Chlorine is passed into sulfur monochloride to saturation, at 6° to 10°C., followed by carbon dioxide to drive off the excess of chlorine.

Grades: Technical.

Containers: Iron drums.

Uses: Rubber industry for vulcanizing; manufacturing vulcanized oils; rubber substitutes and cements; purifying sugar juices; sulfur solvent.

Railroad shipping regulations: White label.

Sulfur Dioxide (Sulfurous acid, anhydride) SO_2.

Color and properties: Colorless gas or liquid; suffocating odor; corrosive poison!

Constants: Gas: Sp.gr. 1.43368; m.p. −76.1°C.; b.p. −10°C.

Soluble in water.

Derivation: (1) By roasting pyrites in special furnaces. The gas is readily liquefied by cooling it with ice and salt, or at a pressure of three atmospheres. (2) By purifying and compressing sulfur dioxide gas from smelting operations.

Grades: Commercial.

Containers: 2, 6, 8, 10, 25, 70, 100, 120, 150 lb. cylinders; ton drums on multi-unit cars; 40,000 lb. tank cars.

Uses: Chemicals (sulfuric acid, ozone from hydrogen peroxide, Hargreave's process of salt cake manufacture, sulfites, hydrosulfites and meta-bisulfites of potassium and sodium, alum from shale, recovery of volatile substances); intermediates; bleaching straw, feathers, silk, basketware, sponges, oils, sugar juices, flour and foods; preservative for beer, wine and meats; restoring the yellow color of the new grain to old barley and oats; cellulose and paper industries; artificial ice industry; disinfecting and fumigating; fire extinguisher in mine fires; tanning; field mouse destruction; agricultural fumigant; extraction of bituminous matters in lignite coal.

Railroad shipping regulations: Green gas label.

Sulfur Flour. See Sulfur.

Sulfur Flowers. See Sulfur.

Sulfur Iodine (Iodine disulfide) I_2S_2.

Color and properties: Brittle masses, grayish-black, metallic luster.

Soluble in carbon bisulfide; slightly soluble in glycerol.

Derivation: Heating iodine mixed with sulfur to fusion in a closed vessel.

Grades: N.F.

Containers: 1 lb. bottles.

Uses: Medicine (treatment of skin diseases, unofficial).

Railroad shipping regulations: None.*

Sulfur, Lac (Lac sulphuris; Milk of sulfur; Precipitated sulfur). A fine, light-colored, amorphous powder, without taste or odor, obtained by the action of hydrochloric acid upon a solution prepared by boiling together sulfur and lime in water.

Uses: Medicine (because of its extreme state of subdivision).

Railroad shipping regulations: None.*

Sulfur Lotum (Washed sulfur). Sublimed sulfur which has been treated for 3 days with dilute ammonia water, then thoroughly washed with water.

Sulfur Olive Oil. See Olive oil (foots).

Sulfur, Plastic. Formed by heating sulfur to 225°C. Used in preparing molds for electrotyping.

Railroad shipping regulations: None.*

Sulfur, Precipitated. See Sulfur, lac.

Sulfur Subchloride. See Sulfur chloride.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Sulfur Trioxide. The anhydride of sulfuric acid. Not a commercial product. See Sulfuric acid.

Sulfuret of Antimony. See Antimony sulfide.

Sulfuretted Hydrogen. See Hydrogen sulfide.

Sulfuric Acid (Oil of vitriol; Dipping acid) H_2SO_4.

Color and properties: Strongly corrosive, dense, oily liquid; colorless to dark brown, depending on purity. Ordinary commercial (not pure) acid dissolves all metals, including platinum, although the latter dissolves very slowly. Concentrated acid (65%) when cold attacks iron, aluminum, copper and lead slowly. Heating the concentrated acid increases its action on metals, except when the boiling-point of the acid is passed. Dilute acid dissolves aluminum, chromium, cobalt, copper, iron, manganese, nickel, zinc and other metals, particularly if heated. It does not dissolve lead or mercury, and has very little action on high-silica iron. Sulfuric acid rapidly disintegrates wood, rubber, textiles and organic materials in general.

Constants: Sp.gr. 1.8342; m.p. 10.46°C.; b.p. 210° to 338°C.

Soluble in water in all proportions with evolution of heat.

Derivation: (a) Chamber Process—Pyrites or sulfur is roasted in specially designed furnaces and the sulfur dioxide collected in a lead chamber, in presence of water, oxygen (or air) and nitrous anhydride. The nitrous anhydride is conventionally obtained from either catalytic oxidation of ammonia or from dissociation of nitrate of soda by means of sulfuric acid and heat. First there is a union of sulfur dioxide, nitrous anhydride, oxygen and water to form nitrosylsulfuric acid. But in presence of water vapor, this nitrosylsulfuric acid is at once decomposed, sulfuric acid being formed and nitrous anhydride regenerated. The oxidation of the sulfur dioxide to sulfur trioxide is due to the interaction of the various oxides of nitrogen with sulfur dioxide and subsequent dissociation of the nitrosulfuric and nitrososulfuric acids. The chamber acids are concentrated in various forms of evaporating devices built of lead, platinum, stoneware, acid-proof metal, fused silica, acid-proof brick, etc.

(b) Catalytic process (Contact process)—The raw materials are sulfur dioxide from pyrites or sulfur and oxygen from the air to produce sulfur trioxide which is absorbed in water. Any concentration of acid can be made. The combining of the sulfur dioxide and oxygen is carried on in presence of a catalyzer. The catalyzers most in use are platinum and vanadium oxide. Gases from sulfur burning can be oxidized direct, whereas gases from ore furnaces are cleansed by cooling, scrubbing with acid and removal of impurities by either filtering or with Cottrell precipitators. Flue dust, sulfur vapors, arsenic, phosphorus and other compounds present in the mixed gases from ore burning must be removed to prevent injurious effects on the contact mass. Vanadium oxide is less susceptible to poisoning by impurities than is platinum.

(c) Much sulfuric acid is made from waste gases of copper or zinc smelters (which are rich in sulfur dioxide) by the chamber and catalytic processes.

Method of purification: Distillation.

Impurities: Arsenic; iron; lead sulfate.

Grades: Technical: The commonest grades are: "Chamber Acid", 53°Bé. or 66.6% H_2SO_4; "Tower Acid", 60°Bé. or 77.7% H_2SO_4; "66 Acid", 66°Bé. or 93.2% H_2SO_4; "98 Acid" or "Contact Acid", 98% H_2SO_4; Oleum (see Fuming sulfuric acid), 100% H_2SO_4 with various additional amounts of SO_3 in solution; Oil of Vitriol (O.V.) by which 66°Bé. acid is generally meant; Battery acid (q.v.). The uses of sulfuric acid are so numerous that almost every strength of acid appears in commerce for some purpose; U.S.P. sp.gr. 1.826 at 25°C., 92.5% H_2SO_4; U.S.P. Dil. sp.gr. 1.067 at 25°C., 10% H_2SO_4.

Containers: Various bottles; 170 lb. carboys; 400, 750, 1,600 lb. drums; tank cars.

Strength: Commercial: 66°Bé.

Uses: Chemicals (manufacture of various organic and inorganic chemicals, particularly sulfates and acids); fertilizers; petroleum refining; explosives; leather industry; metallurgy (pickling iron and steel; precious metal refining; electroplating; cleaning copper and silver; metallurgy of copper, iron, magnesium, cobalt and nickel); electric batteries; rubber reclaiming; textile industry; rayon; sulfonating oils; synthetic perfumes; ceramics; manufacture of fatty acids; neutralizing alkaline reactions of fermenting liquors; removal of lime used to soften and dehair hide scraps used in the manufacture of glue and gelatin; drying agent; mineral colors; pyroxylin plastics; wax purification; sugar industry; tar washing; parchment paper; fungicide; weed destroyer; exterminator; photographic processes; process engraving and lithography; analytical reagent.

Estimated Distribution of Sulfuric Acid (50°Bé.) in 1929:†

Consuming Industries:	Per Cent
Fertilizers	29.9
Petroleum refining	20.0
Chemicals	10.3
Coal products	10.3
Iron and steel	9.7
Other metallurgical	7.8
Paints and pigments	2.7
Explosives	2.4
Textiles	1.0
Rayon	1.9
Miscellaneous	4.0
	100.0

† Based on data in Chem. & Met. 37:4 (1930).

Fire hazard: Dangerous (?)*

Railroad shipping regulations: White label.

Sulfuric Acid, Aromatic (Elixir of vitriol).

Color and properties: Clear, reddish-brown liquid; peculiar, aromatic odor; pleasant acid taste when diluted.

Soluble in water.

Derivation: A mixture of sulfuric acid with alcohol, tincture of ginger, and oil of cinnamon.

Grades: U.S.P.

Containers: Glass bottles.

Uses: Medicine (tonic and astringent in gastric and intestinal disorders).

Railroad shipping regulations: White label.

Sulfuric Acid, Fuming (Oleum).

Solution of sulfuric anhydride in 100% sulfuric acid. This dissolved SO_3, if combined with water, yields the additional quantity of sulfuric acid indicated below as per cent available.

Strength (% Free SO_3)	Per Cent Available	Specific Gravity	Freezing Point °F.
20	104.5	1.92	12.2
25	105.6	1.93	30.9
65	114.5	2.02	33.4

Derivation: By contact process (see sulfuric acid). The acid in absorbers is maintained at percentages noted above and filled into containers without dilution. 65% strength is prepared by distilling fuming acid of lower strength.

Grades: Technical; C.P.

Containers: 1, 9 lb. bottles; steel drums; tank cars.

Uses: Nitrating agent (mixed with nitric acid); fortifying acid; dyes; explosives; pyroxylin plastics; oil refining.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Fire hazard: Dangerous.* Reacts with water explosively, and in handling every precaution should be taken to protect operator.
Railroad shipping regulations: White label.
See also Sulfuric acid.

Sulfuric Ether. See Ether.

Sulfurized Asphalts (Dubb's asphalt; Pittsburgh flux; Ventura flux). Products obtained by heating residual oil or residual asphalt with sulfur at high temperatures.
Railroad shipping regulations: None.*

Sulfurous Acid H_2SO_3.
Color and properties: Colorless liquid; suffocating sulfur odor.
Soluble in water.
Derivation: Absorption of sulfur dioxide in water.
Grades: Technical.
Containers: Carboys; drums.
Uses: Organic synthesis; bleaching straw hats, wicker-ware, textiles, etc.; paper manufacture; wine manufacture; brewing; metallurgy; medicine (parasiticide); reagent in analytical chemistry; sulfites.
Railroad shipping regulations: None.*

Sulfurous Acid, Anhydride. See Sulfur dioxide.

Sulphexet. See Hexamethylenetetramine sulfosalicylate.

Sulphexine. See Hexamethylenetetramine sulfosalicylate.

Sulphoid. See Sulfur, colloidal.

Sumac (Shumac; Rhus glabra).
Derivation: The leaves and dried ripe fruit from various plants of the Rhus family. Found in many countries; best grades from Italy, Spain, Greece and Virginia.
Grades: 25% tannin (liquid); U.S.P.
Containers: Powder: 150, 160 lb. burlap bags. Extract: 450-500 lb. wooden barrels.
Uses: Textile dyeing; tanning industry; medicine (for its astringent effect).
Railroad shipping regulations: None.*

Sumac Wax. See Japan wax.

Sumatra Wax. See Fig tree wax.

Sumbul (Musk root).
Dried rhizome and root of Ferula sumbul.
Habitat: Central Asia, East Indies.
Grades: Technical.
Containers: Bags.
Uses: Medicine (for its quieting effect on the nerves and as a stimulant to mucous membrane; manufacture of perfumes.
Railroad shipping regulations: None.*

Sumbul oil.
Color and properties: Dark-colored viscous essential oil; musk-like odor.
Constants: Sp.gr. 0.941 to 0.964; optical rotation, −6°20′; acid value, 7.0; saponification value, 24 to 92.
Solubility in alcohol: In 1 vol. or less of 90% alcohol.
Derivation: Distilled from the root of Ferula sumbul.
Railroad shipping regulations: None.*

Summer Black Oils.
Color and properties: Black lubricating oils.
Constants: Fire test 540°F.
Uses: Lubricant for railroad car axles; tempering oil; waterproofing cement.
Railroad shipping regulations: None.*
See also Axle oils, railroad; also Lubricants, United States Government Master Specifications.

Sundew. See Drosera.

Sunflower. See Helianthus.

Sunflower Oil.
Color and properties: Pale yellow liquid; mild taste; pleasant odor.
Constants: Sp.gr. 0.924 to 0.926; iodine value 125; refractive index 1.4611.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: By expression from the seeds of Helianthus annuus.
Method of purification: Filtration.
Grades: Crude; refined.
Containers: Wooden barrels.
Uses: Varnishes; soap; illuminant; edible oil, particularly in Russia.
Railroad shipping regulations: None.*

Sunned Oil.
An oil which has been increased in density and fitted for use as a lubricant by "sunning," i.e., by allowing the oil to form a thin layer on the surface of a tank of warm water and exposing it to the action of the sun's rays. The process is now out of date.
Railroad shipping regulations: None.*
See Reduced oils.

Sunstone (Heliolite).
A gem stone ranging in color from grayish-white to reddish-gray. It is either a variety of oligoclase or albite (see Feldspar). Flakes of hematite (q.v.) or goethite (q.v.) give it a speckled bronze appearance.
Occurrence: United States (Pennsylvania, Virginia), Sattel Island, Ceylon, Norway.

Super Cement. See under Cements, structural.

"Super-Spectra" Black. See under Blacks.

"Superba" Black. See under Blacks.

Superpalite. See Trichloromethyl chloroformate.

Superphosphate (Acid phosphate)
A term now being used by the fertilizer industry to replace acid phosphate.
It is made by the action of sulfuric acid on insoluble phosphate rock according to the following equation:

$$Ca_3(PO_4)_2+2H_2SO_4+5H_2O= CaH_4(PO_4)_2.H_2O+2CaSO_4.2H_2O.$$

The mixture of the "available or superphosphate" and the gypsum as shown in the above equation is the superphosphate marketed by the fertilizer industry.
A typical analysis of superphosphate is as follows: Moisture 10 to 15%; available phosphoric acid 14 to 20%; insoluble phosphoric acid 0.3 to 2%; total phosphoric acid 15 to 21%.
Uses: Fertilizer.
Railroad shipping regulations: None.*
See also Double superphosphate.

Swallow-wort. See Vincetoxicum.

Sweet Almond. See Amygdala dulcis, U.S.P.

Sweet Basil Oil. See Basil oils.

Sweet Bay. See Laurus.

Sweet Bay Oil. See Laurel oil, volatile.

Sweet Birch Oil. See Betula oil.

Sweet Cane. See Calamus.

Sweet Clover, Yellow. See Melilotus.

Sweet Fennel. See Fennel.

Sweet Flag. See Calamus.

Sweet Grass. See Calamus.

Sweet Gum, Oriental. See Styrax.

Sweet Marjoram. See Marjoram.

Sweet Oil. See Olive oil.

Sweet Orange. See Orange peel, sweet.

Sweet Viburnum. See Viburnum prunifolium.

Sweet Wood Bark. See Cascarilla.

Sweetaloys. Ferrous alloys which have following compositions: (a) Sweetaloy 16 contains 82% iron, 16 to 18% chromium, 0.5% manganese, 0.5% nicked, 0.35% carbon. It offers good resistance to all concentrations of hot and cold nitric acid, cold concentrated acetic acid, cold sodium and ammonium hydroxides and mine and sea waters. (b) Sweetaloy 17 contains 69% iron, 18 to 20% chromium, 8 to 10% nickel, 0.5% manganese and 0.15% carbon. It is resistant to all concentrations of cold nitric and acetic acids and ammonium and sodium hydroxides, mine and sea waters and moist sulfurous atmospheres. (c) Sweetaloy 18 contains 67% iron, 22% nickel, 10% chromium, 0.5% manganese, and 0.2% carbon. It is resistant to hot and cold 10% sulfuric acid, cold dilute sodium hydroxide and sea water. (d) Sweetaloy 19 contains 70% iron, 28% chromium, 0.5% manganese, 0.5% nickel, 0.5% carbon. It is resistant to all concentrations of cold nitric acid and sodium and ammonium hydroxides and mine and sea waters. (e) Sweetaloy 20 contains 45% iron, 36% nickel, 18% chromium, 0.5% manganese and 0.3% carbon. It is resistant to hot and cold dilute sulfuric acid (up to 10%) and to mine and sea waters. (f) Sweetaloy 22 contains 60% iron, 28% chromium, 10% nickel, 0.5% manganese and 0.35% carbon. It offers good resistance to all concentrations of cold nitric and acetic acids and sodium and ammonium hydroxides, mine and sea waters, and moist sulfurous atmospheres.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Sykose. See Saccharin.

Sylvanite (Au, Ag)Te_2.
One of the gold telluride group of minerals. Corresponds to the same general formula as calaverite (q.v.) and krennerite (q.v.). Steel-gray to silver-white color. Brilliant metallic luster becoming dull on exposure.
Contains 24.2% Au, 13.3% Ag.
Constants: Sp.gr. 7.9 to 8.3; hardness 1.5 to 2.
Occurrence: United States (California, Colorado), Transylvania, Australia.
Uses: Source of gold.

Sylvine. See Sylvite.

Sylvinite (Hartsalz).
Granular masses of sylvite (q.v.) found naturally intermixed with rock salt and kieserite (q.v.).

Sylvite (Sylvine) KCl.
A natural potassium chloride. Contains 52.4% potassium, sometimes with up to 0.26% bromine.
Color and properties: Colorless or white, bluish or reddish in color; streak, white; vitreous luster. Resembles rock salt in appearance but is easily identified by difference in sp.gr.
Constants: Sp.gr. 1.97 to 1.99; hardness 2.
Occurrence: Italy, Germany, Galicia.
Uses: Source of potassium compounds used for fertilizers.

Synaptase. See Emulsin.

Syncaine. See Aminobenzoyldiethylaminoethanol hydrochloride, para-.

Syntagmatite. See Hornblend.

Synthargol. A colloidal silver preparation used in medicine as an antibacterial. Unofficial.
Railroad shipping regulations: None.*
See also Silver, colloidal.

Synthetic Indigo Blue. See Indigotin.

Syntonin (Para-peptone; Muscle fibrin).
Color and properties: Yellow powder.
Soluble in dilute hydrochloric acid and alkaline carbonates.
Derivation: By conversion of albumose by means of dilute hydrochloric acid.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Syrian Asphalt. A glance pitch (q.v.) found in Syria near Beirut, containing mineral matter up to 5% and having a fusing point (B & R) of 295°F.
Railroad shipping regulations: None.*

Syrupus, U.S.P. Concentrated solutions of sugar in aqueous fluid with or without the addition of medicating or flavoring ingredients.

Sysertskite.
The darker colored variety of iridosmine (q.v.). Contains less than 30% iridium. See also Nevyanskite.
Constants: Sp.gr. 20 to 21.12.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

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TNT. See Trinitrotoluene.

Tabbyite.
A mineral hydrocarbon found in Utah and elsewhere. Used as a filler in rubber and roofing materials.

Table Salt. See Sodium chloride.

Tacamahac.
Derivation: The resin from various species of Amyris and Icica.
Habitat: West Indies and South America.
Grades: Technical.
Containers: Bags.
Uses: Medicine; fumigating mixtures.
Railroad shipping regulations: None.*

Tachiol. Silver fluoride.

Tailed Pepper. See Cubeba.

Tailings.
In flour-milling, the product left after grinding and bolting middlings (q.v.).

Taka-diastase. Proprietary names for an amylolytic enzyme preparation from the growth of Aspergillus oryzae.
Color and properties: Whitish-yellow powder. Soluble in water.
Derivation: Sterile cereal media are inoculated with Aspergillus oryzae. After 48 hours the enzymes are extracted.
Uses: Medicine as a digestive agent.
Railroad shipping regulations: None.*
See also Polyzime.

"Takatol." A proprietary brand of para-aminophenol.

Talc $H_2Mg_3(SiO_3)_4$.
A natural hydrous magnesium silicate. The foliated masses are known as talc, the compact massive varieties as steatite. Soapstone and potstone are impure forms of steatite. Indurated talc is an impure, slatey variety harder than ordinary talc. It is soft, easily cut or powdered, has a greasy or soapy feeling and has a high resistance to acids, alkalis and heat.
Constants: Sp.gr. 2.6 to 2.8.
Physical characteristics: Talc: White, greenish-white, light green; hardness 1. Steatite, soapstone or potstone: Ranges from gray to green; coarse or fine granular masses; hardness 1.5 to 2.5.
Occurrence: United States (Maine, Vermont, Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, North Carolina, Virginia), Austria, Switzerland, England, Shetlands, Bavaria, Italy, India, South Africa.
Uses: Filler in all kinds of paper; filler for miscellaneous products such as rubber, soap, plastics, cosmetics, paints, plaster, roof cements, lubricating compositions, polishes and dressing for leather products, linoleum, insulating compositions, artificial stone and flooring pottery, pencils, crayons; also used as a filtering medium; an absorbent; in metallurgy; dusting powder for industrial purposes; toilet powder; pharmaceuticals; in textile finishing, etc.

Talca Gum. See Arabic gum.

Talcum. See Magnesium silicate.

Talha Gum. See Arabic gum.

Tallow.
Derivation: The fat extracted from the solid fat or "suet" of cattle, sheep or horses. The quality varies depending on the season, the food and age of the animal.
Chief constituents: Stearin, palmitin and olein.
Grades: Edible; inedible; beef tallow; mutton tallow; horse fats.
Containers: 50 lb. tierces; 375 lb. wooden barrels.
Uses: Soap stock; leather dressing; candles; food; railway axle grease; manufacture of stearin and oleo oil.
Railroad shipping regulations: None.*

Tallow, Chinese. See Tallow, vegetable.

Tallow-seed Oil. See Stillingia oil.

Tallow Shrub. See Myrica.

Tallow, Vegetable.
Derivation: A hard fat from the fruit of the Chinese tallow tree. The fruit is steamed in a perforated kettle and the fat which melts is collected.
Grades: Technical.
Containers: 100 lb. matted packages.
Uses: Soap stock.
Railroad shipping regulations: None.*

Talmi Gold. See Abyssinian gold.

Tamarind.
Derivation: Preserved pulp of the fruit of Tamarindus indica.
Habitat: East Indies, Africa and West Indies.
Grades: N.F.
Containers: Boxes.
Uses: Medicine (laxative); condimental sauces.
Railroad shipping regulations: None.*

Tanacetum (Tansy; Tanzy).
Derivation: Leaves and tops of Tanacetum vulgare.
Habitat: Asia, Europe and North America.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Tangerine Oil. See Mandarin oil.

Tangkawang Fat. See Borneo tallow.

Tankage, Concentrated. The product obtained in abattoir by-product plants by evaporating and drying tank water and tankage press water. It contains 15 to 17% ammonia and is mixed with the tankage before drying. This raises the percentage of ammonia in the tankage and does away with the making of a second product.
Railroad shipping regulations: None.*

Tankage, Garbage.
Garbage treated with steam under pressure, the water and some of the grease removed by pressing and further grease removed by solvent extraction. Contains from 3 to 4% ammonia, 2 to 5% phosphoric acid and 0.50 to 1.00% potash.
Uses: Fertilizer.
Railroad shipping regulations: Must not contain less than 8% moisture.

Tankage, Gashouse. See Spent oxide.

Tannic Acid (Gallotannic acid; Tannin; Digallic acid) $C_{14}H_{10}O_9$.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Color and properties: Lustrous, faintly yellowish, amorphous powder or spongy mass.
Constants: M.p.: Decomposes at 210°C.
Soluble in water, alcohol and acetone.
Derivation: Extraction of powdered gall-nuts with water and alcohol.
Grades: Technical; C.P.; U.S.P.; U.S.P., fluffy.
Containers: Technical: 5, 25 lb. cans; 50 lb. boxes; 200, 350 lb. barrels. C.P.: 1 lb. bottles and cartons. U.S.P.: 5, 25 lb. cans; 25 lb. boxes; 200 lb. barrels. Fluffy: ¼, 1 lb. cartons; 10 lb. kegs; 25, 50 lb. barrels.
Uses: Chemicals (tannates, gallic acid, pyrogallic acid, hydrosols of the noble metals); alcohol denaturant; tanning; textiles (mordant and fixative); electroplating; galvano-plastics (gelatin precipitant); clarification agent in wine manufacture and brewing; inks; pharmaceuticals; deodorization of crude oil; rubber substitutes; photography; paper (sizing, mordant for colored papers); stove polishing compounds.
Railroad shipping regulations: None.*

Tannigen. See Acetyl tannic acid.

Tannin. See Tannic acid.

Tannin Albuminate. See Albumin tannate.

Tannin-formaldehyde. See Tannoform.

Tannismuth (Bismuth bitannate; Bismuth tannate; Bismuth Ditannate).
Color and properties: Light yellow powder. Contains 17 to 21% bismuth. Stated to be more astringent than other insoluble bismuth salts.
Soluble in acids; insoluble in water.
Uses: Medicine (astringent and antiseptic, intestinal catarrh, unofficial).
Railroad shipping regulations. None.*

Tannocreosote. See Creosote tannate.

Tannoform (Methylene ditannin; Tannin-formaldehyde) $CH_2(C_{14}H_9O_9)_2$.
Color and properties: Light pinkish powder.
Constants: Decomposes at 230°C.
Soluble in alcohol, dilute ammonia, sodium hydroxide, potassium hydroxide; insoluble in organic solvents.
Derivation: Reaction of tannin and formaldehyde in hot aqueous solution and precipitating with concentrated hydrochloric acid.
Uses: Medicine (astringent, antiseptic, enteritis and other diarrheas, eczema, bed sores, night sweats, hyperidosis of feet, unofficial).
Railroad shipping regulations: None.*

Tannon. See Hexamethylenetetramine tannin.

Tannopin. See Hexamethylenetetramine tannin.

Tannothymol. A condensation product of formaldehyde, thymol and tannin used in medicine as an intestinal antiseptic. Unofficial.
Railroad shipping regulations: None.*

Tannyl Acetate. See Acetyl tannic acid.

Tansy. See Tanacetum.

Tansy Oil.
Color and properties: Yellowish liquid; strong odor; becomes brown on exposure to air and light; poisonous!
Chief known constituents: Thujone; camphor; borneol.
Constants: Sp.gr. 0.925 to 0.955.
Soluble in alcohol, ether, carbon bisulfide and chloroform.
Derivation: Distilled from the herb, Tanacetum vulgare.
Method of purification: Rectification.
Grades: Technical.
Containers: 1, 5 lb. bottles; 20 lb. tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Tantalic Acid. See Tantalum oxides.

Tantalite. See Columbite.

Tantalum. Ta.
Color and properties: (a) Black powder. (b) Steel-blue-colored metal when unpolished; nearly a platinum-white color when polished.
Constants: Sp.gr. (a) 14.491 (b) 16.6 (worked metal); m.p. 2,850°C. Tensile strength of drawn wire may be as high as 130,000 lbs. per sq. in. Linear coefficient of expansion is only slightly less than platinum and more than molybdenum or tungsten. Electrical resistance about 8 times that of copper and three times that of tungsten.
Soluble in fused alkalis; insoluble in acids.
Derivation: By heating the double fluoride of potassium and tantalum in an electric furnace.
Corrosion resistance: 99.5% pure tantalum is resistant to all concentrations of hot and cold sulfuric (except concentrated boiling), hydrochloric, nitric and acetic acids, hot and cold dilute sodium hydroxide, all dilutions of hot and cold ammonium hydroxide, mine and sea waters, moist sulfurous atmospheres, aqueous solutions of chlorine.
Forms available: Powder; sheet; rods; wire.
Uses: Dental instruments; surgical tools; pen points; filament wire, plates, and support wire for incandescent lamps of thermionic tubes; hypodermic needles; cathodes for use in electrochemical analysis; analytical weights; laboratory ware; parts of scientific instruments; acid-proof pumps and parts of chemical equipment; electrical devices; radio.

Tantalum Ore. See Columbite.

Tantalum Oxides (Tantalic acid) (a) Dioxide, TaO_2; (b) Tetroxide, Ta_2O_4; (c) Pentoxide, Ta_2O_5.
Color and properties: (a) Brown powder; (b) Dark gray powder; (c) Rhombic, crystalline prisms.
Constants: Sp.gr.: (c) 7.6; m.p.: (a) Oxidizes; (b) Oxidizes; (c) Infusible.
Insoluble in water and acids.
Derivation: From tantalite, by removal of other metals.
Grades: Technical.
Containers: Wooden kegs.
Uses: Tantalum.
Railroad shipping regulations: None.*

Tantiron. A ferrous alloy containing 84.87% iron, 13.5% silicon, 1% carbon, 0.4% manganese, 0.18% phosphorus, 0.05% sulfur. It offers good resistance to all concentrations of hot and cold sulfuric acid, hydrochloric acid (except boiling concentrated), nitric acid, acetic acid, sodium and ammonium hydroxides, and mine and sea waters, moist sulfurous atmospheres and aqueous solutions of chlorine.

Tanzy. See Tanacetum.

Tap Cinder.
The slag from the puddling furnace. It is essentially a basic silicate of iron.

Tapioca Dextrin. See Dextrin.

Tar.
A dark-colored, bituminous substance, liquid or semi-liquid at room temperature, often possessing a characteristic "tarry" odor, usually insoluble in water, but miscible with carbon bisulfide, benzene, etc. On distillation, oxidation, etc., forms a pitch. Its composition and origin are variable.
Railroad shipping regulations: None.*

Tar, Barbados (Tar, green). A commercial term for crude Barbados petroleum, formerly used in medicine.
Railroad shipping regulations: None.*

Tar Camphor. See Naphthalene.

Tar, Candle. See Stearin and fatty acid pitches.

Tar, Coal. See Coal-tar.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Tar, Dehydrated.
Color and properties: Dark brown, thick, viscid liquid; poisonous!
Derivation: Tar from which the water has been driven off.
Grades: Technical.
Containers: Barrels; tank cars.
Uses: Water-proofing compounds; roads; medicine.
Railroad shipping regulations: None.*

Tar, Green. See Tar, Barbados.

Tar, Hardwood. See Wood tar.

Tar Oil. Coal-tar creosote (q.v.).

Tar Oil, Pine. See Tar oil, wood.

Tar Oil, Rectified. See Tar oil, wood.

Tar Oil, Wood (Pine-tar oil; Rectified tar oil).
Color and properties: Almost colorless liquid when freshly distilled; turns dark reddish-brown; strong tarry odor and taste; poisonous!
Chief constituents: Phenols.
Constants: Sp.gr. 0.862 to 0.872.
Soluble in ether, chloroform, alcohol, and carbon bisulfide.
Derivation: Distilled from wood-tar obtained by the destructive distillation of the wood of Pinus palustris.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Medicine (in treatment of chronic bronchitis and skin diseases).
Railroad shipping regulations: None.*

Tar, Pine.
Color and properties: Thick, dark, viscous mass; peculiar terebine odor.
Derivation: From the destructive distillation of Pinus palustris.
Grades: Technical.
Containers: 600 lb. barrels.
Uses: Roofing compounds.
Railroad shipping regulations: None.*

Tar, Refined. (a) Dehydrated tar. See Tar, dehydrated. (b) Tar residuum fluxed with a tar distillate.
Railroad shipping regulations: None.*

Tar, Water-gas.
Color and properties: Dark brown, thick, viscid liquid; poisonous!
Constants: Sp.gr. 1.005 to 1.15.
Derivation: A by-product from the manufacture of illuminating gas (carburetted water gas).
Grades: Technical.
Containers: Iron drums; tank cars.
Uses: Distillation for benzene, phenol, etc.
Railroad shipping regulations: None.*

Tar Weed. See Grindelia.

Tar, Wood (Tar, hardwood).
Color and properties: Dark brown, thick, viscid liquid; poisonous!
Derivation: A by-product from the destructive distillation of wood.
Grades: Technical.
Containers: Tank cars.
Uses: Preservative.
Railroad shipping regulations: None.*

Taraxacum (Dandelion; Lion's tooth).
Color and properties: Blackish-brown roots; odorless; bitter taste.
Derivation: The dried rhizome and root of the dandelion, Leontodon taraxacum.
Habitat: North America and Europe.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (of doubtful value).
Railroad shipping regulations: None.*

Tarnowitzite. See Aragonite.

"Tarola." The proprietary name for a coal-tar product stated to be useful as a cattle and sheep dip.

Tarragon Oil. See Estragon oil.

Tartar, Chalybeated. See Iron-potassium tartrate.

Tartar, Cream of. See Potassium bitartrate.

Tartar, Crude. See Argols.

Tartar Emetic. See Antimony-potassium tartrate.

Tartar, Salts of. See Potassium carbonate.

Tartaric Acid (Dihydroxysuccinic acid; Dextro-tartaric acid) $C_2H_2(OH)_2(COOH)_2$.
Color and properties: Colorless, transparent crystals.
Constants: Sp.gr. 1.7598; m.p. 170°C.
Soluble in water, alcohol and ether.
Derivation: Wine-lees containing cream of tartar and calcium tartrate are treated with sufficient milk of lime to convert the cream of tartar into calcium tartrate. The calcium tartrate is dissociated with sulfuric acid, the solution filtered and the tartaric acid obtained by crystallization.
Method of purification: Recrystallization.
Grades: Technical; U.S.P.
Containers: 1 oz. bottles; ¼, 1 lb. bottles; 1 lb. cartons; 5, 25, 50 lb. boxes; 100, 112 lb. kegs; 224, 240, 300, 550 lb. barrels.
Uses: Chemicals (tartrates, e.g., cream of tartar, tartar emetic, acetaldehyde); organic synthesis; tanning; effervescent beverages; baking powder preparations; fruit esters; ceramics; galvanoplastics; Schnitzler's green; effervescent medicinal preparations; remedies for foot ailments; photography (printing and developing, light-sensitive iron salts); textile industry; silver glass mirrors; coloring metals.
Railroad shipping regulations: None.*

Tartaric Acid, Inactive. See Racemic acid.

Tartaric Acid, Para-. See Racemic acid.

Tartarine. A yellow dye.

Tartarized Antimony. See Antimony-potassium tartrate.

Tartarized Iron. See Iron-potassium tartrate.

Taurocholic Acid (Choleic acid; Choleinic acid; Chollaic acid; Sulfocholeic acid) $C_{26}H_{45}NSO_7$.
Color and properties: Yellowish, crystalline mass.
Soluble in water and alcohol.
Derivation: Obtained from ox bile.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (antiseptic).
Railroad shipping regulations: None.*

Tautolite. See Allanite.

Tea Berry. See Gaultheria.

Tea Oil (Tea-seed oil).
Color and properties: Straw- or amber-colored liquid, resembling olive oil.
Constants: Sp.gr. 0.917 to 0.927; saponification value 194; iodine value 88.
Soluble in alcohol, ether and chloroform.
Derivation: By expressing the seeds of Thea sasanqua. (This is not the plant from which tea is prepared, although botanically related).
Impurities: Saponin; other similar but cheaper oils.
Method of purification: Rectification.
Grades: Technical.
Containers: Wooden barrels.
Uses: Illuminant; soap making; edible oil; hair oil; lubricant.
Railroad shipping regulations: None.*

Tea-seed Oil. See Tea oil.

Teal Oil. See Sesamé oil.

Technical Gelatin. See Glue and gelatin.

Teel Oil. See Sesamé oil.

Teglac No. 15. A trade name for hard, synthetic resin which is stated to have good film-forming properties.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Telluric Acid (Trihydrated telluric oxide; Dehydrated telluric hydroxide; Hydrogen tellurate) H_2TeO_4.
Color and properties: White crystals.
Constants: Sp.gr. 3.425; m.p.: Decomposes at 160°C.
Soluble in hot water and alkalis; insoluble in cold water.
Derivation: By the action of sulfuric acid on barium tellurate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical reagent.
Railroad shipping regulations: None.*

Telluric Bismuth. See Grünlingite, Tetradymite, Wehrlite, and Joseïte.

Telluric Hydroxide, Dehydrated. See Telluric acid.

Telluric Oxide, Trihydrated. See Telluric acid.

Telluric Silver. See Hessite.

Tellurine. See Diatomaceous earth.

Tellurium Te.
Color and properties: Dark gray powder.
Constants: Sp.gr. 6.015 to 6.27; m.p. 452°; b.p. 1,390°C.
Soluble in sulfuric acid, nitric acid; potassium hydroxide and potassium cyanide solution; insoluble in water.
Derivation: By the reduction of telluric oxide.
Grades: Technical.
Containers: Wooden kegs; glass bottles.
Uses: Tellurium compounds; coloring porcelain, potteries and glass; alloys; photography (toning); pharmaceuticals.
Railroad shipping regulations: None.*

Tempering Oils.
Summer black oils (q.v.) and steam-hammer oils (q.v.) are stated to be suitable for this purpose.
A viscous neutral oil also said to be satisfactory has the following constants: (a) Straight reduced: Bé.gr. 30°; flash point 415°F.; fire test, 480°F.; cold test 20°F.; Saybolt viscosity 220. (b) Stock loaded: Bé.gr. 30.5°; flash point 395°F.; fire test 450°F.; cold test 30°F.; Saybolt viscosity 240.
Uses: Tempering metals.
Railroad shipping regulations: None.*

Tengerite. A Texas mineral supposed to be chiefly yttrium carbonate.

Tennantite (Binnite).
A variety of Fahlore (q.v.). Color and properties: Blackish lead-gray to iron-black; contains 49.83% to 57.5% Cu, 17.0% to 19.04% arsenic, 25.5% to 27.60% sulfur, some silver, iron and lead.
Constants: Sp.gr. 4.37 to 4.49; hardness 3 to 4.
Occurrence: United States (Colorado, Montana), England, Germany, Norway, Canada.
Uses: Ore of copper.

Tenorite (Melaconite; Black oxide of copper) CuO.
Color and properties: Copper mineral occurring as dull black earthy masses, black powder, or shining black scales; streak, black; luster, metallic in scales, dull in masses; contains 79.85% copper.
Constants: Sp.gr. 5.82 to 6.25; hardness 3.
Occurrence: United States (Utah, Arizona, Wyoming, Oregon, Tennessee) Italy.

Tensilac 39. Trade name for a rubber accelerator.

Tephroite. See Olivine.

Terbia. See Terbium oxide.

Terbium Tb.
One of the rare earth (q.v.) metals.

Terbium Chloride $TbCl_3 . 6H_2O$.
Color and properties: Transparent, colorless, prismatic crystals. Very hygroscopic.
Railroad shipping regulations: None.*

Terbium Nitrate $Tb(NO_3)_3 . 6H_2O$.
Color and properties: Colorless monoclinic needles.
Constants: M.p. 89.3°C.
Railroad shipping regulations: Yellow label.

Terbium Oxide (Terbia) Tb_2O_3.
Color and properties: White.
Railroad shipping regulations: None.*

Terbium Peroxide Tb_4O_7.
Color and properties: Dark brown or black mass.
Soluble in mineral acids.
Derivation: By heating the oxalate.
Railroad shipping regulations: None.*

Terebene.
Color and properties: Colorless liquid.
Chief known constituents: Camphene.
Constants: Sp.gr. 0.862 to 0.866; optical rotation, inactive; b.p. 160° to 170°C.
Derivation: By the action of sulfuric acid on turpentine.
Solubility in alcohol: In 5 vols. of 90% alcohol.
Railroad shipping regulations: None.*

Terebinthina Canadensis. Canada turpentine.

Terebenthine. See Pinene.

Terlinguaite Hg_2ClO.
Color and properties: Sulfur yellow mineral, changing to olive-green on exposure; adamantine luster; contains 88.65% Hg, 7.85% Cl, 3.50% O.
Soluble in nitric acid.
Constants: Sp.gr. 8.72; hardness 2 to 3.
Occurrence: United States (Texas).

Teminala Chebula. See Myrobalans.

Terne-plate. Terne-plate is a product made by coating steel sheet with an alloy of lead and tin. This material, commercially often known as "roofing tin," is not infrequently confused with true tin coatings. According to Rawdon, "Protective Metallic Coatings," New York, Chemical Catalog Co., Inc., 1928, "the composition of terne coatings varies within rather wide limits. Commercial terne coatings with a tin content as low as 12% are made as well as some containing as much as 50%. The most commonly used one in this country, however, is that of 75% lead and 25% tin. A terne coating, on account of the lead contained, does not have the bright finish of tin-plate no matter how much it may be polished.

"The manufacture of terne-plate follows quite closely that of tin-plate (q.v.). Much of the light-coated product is made by means of a machine identical in all essential respects to that used for tin-plate of coke grade, the flux used being zinc chloride. The speed at which the sheets are passed through must be reduced in order to obtain as thick a coating as possible, and a higher temperature is required in order to maintain the bath in a molten state. In order to obtain a coating heavier than 15 pounds per base box, redipping of the sheets after they have passed through this machine is necessary. A great deal of terne-plate, however, is still made by a process quite similar to the hand-dipping process originally used for tin plate.

"During the solidification of the coating, a characteristic surface network or crystal pattern is formed which is analogous to the spangle on zinc-coated sheet. This appearance is known as 'mottle' and the size of the network increases with the thickness of the coating. It serves a rather useful purpose, therefore, as an index of the weight of coating.

"Since a greater part of commercial terne-plate is used for roofing and similar purposes for which it is usually necessary to use the entire sheet, without cutting it, very close inspection and grading are necessary. The 'prime' sheets must be free from all visible defects and even in the 'menders' only such defects as can be remedied by redipping the sheet are permitted. The sheets of the 'stripper' grade correspond to the seconds in the tin-plate. They may be rerun and converted into 'primes' having a lighter weight coating. The sheets of 'scrap' grade are of no practical use.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

"The weight of coating on terne-plate is expressed in a manner similar to that used for tin-plate. In this case the base box consists of 112 sheets, 20 by 28 inches. The weight of coating varies according to the grade, from 8 to 40 pounds per base box. The following weights of coating have been recently agreed upon by manufacturers, distributors and users (1925 'Simplified practice recommendation No. 30, Terne plate,' United States Bureau of Standards), 8, 15, 20, 25, 30, 32 and 40 pounds per base box; the two weights, 12 and 35 pounds per base box, formerly used, being discontinued.

"Most of the sheets used for making terne-plate for roofing purposes are either of the IC weight, approximately 30 United States standard gage, or IX which is approximately 28 gage in thickness. In the agreement mentioned above it was recommended that no terne-plate lighter than IC in thickness henceforth be manufactured for roofing purposes in the 28 by 20 inch sheets, commonly termed 'short ternes.'

"The use of terne-plate for other uses than roofing has recently increased greatly. The material is admirable for deep stamping operations and nearly 40% of the amount manufactured now is being used in this manner. Large quantities are used in the manufacture of gasoline tanks. Sheets much larger and heavier than the roofing size are manufactured for such purposes. They are known as 'long ternes' by the trade.

"Coatings of lead or lead-rich alloys afford only a mechanical protection of iron against corrosion. Terne-plate of the heavier weights of coating, for example, 25- to 40-pound coatings, however, gives very satisfactory service as roofing material. It is necessary that such roofs be kept painted. The excellent paint-holding properties of such coatings compensate for some of the possible shortcomings which might be expected of coatings of this kind. The resistance of lead coatings to corrosive attack by sulfuric acid also makes them valuable for service for which coatings such as zinc are entirely unsuited."

See also Lead coating, lead-lining and lead-burning.

Terpene Hydrochloride (Pinene hydrochloride; Camphor, artificial; Turpentine camphor) $C_{10}H_{16}HCl$.
Color and properties: White, crystalline mass, resembling camphor; turpentine and camphor odor.
Constants: M.p. 125°C.; b.p. 208°C.
Soluble in alcohol; insoluble in water.
Derivation: By heating turpentine with hydrochloric acid.
Grades: Technical.
Containers: Boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Terpilenol. See Terpineol.

Terpine Hydrate (Dipentene glycol) $C_{10}H_{20}O_2.H_2O$.
Color and properties: Colorless, lustrous, rhombic crystalline prisms.
Constants: M.p. 116° to 117°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: Slowly formed from oil of turpentine in contact with dilute nitric acid and alcohol.
Grades: Technical; U.S.P.
Containers: 1 lb. cans and cartons; 100 lb. net fiber drums.
Uses: Drug; raw material for terpineol.
Railroad shipping regulations: None.*

Terpineol (Alpha-terpineol; Beta-terpineol; Lilacine; Terpilenol) $C_{10}H_{17}OH$.
Color and properties: Colorless liquid; lilac odor.
Constants: Sp.gr.: Alpha- 0.9357; beta- 0.923. M.p.: Alpha- 35°C.; beta- 32°C.; gamma- 69° to 70°C. B.p.: Alpha- 218°C.; beta- 210°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating terpine hydrate with phosphoric acid. Occurs naturally in several essential oils.
Method of purification: Distillation.
Grades: Technical.
Containers: 1, 5, 10 lb. bottles; 50 lb. tins; 1,000 lb. drums.
Uses: Perfumes (lilac); soap.
Railroad shipping regulations: None.*

Terpineol, Alpha-. See Terpineol.

Terpineol, Beta-. See Terpineol.

Terpinyl Acetate $C_{10}H_{17}CO_2CH_3$.
Color and properties: Colorless liquid; characteristic odor.
Constants: Sp.gr. 0.9705; m.p. —50°C.; b.p. 220°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By heating terpine with acetic acid in presence of sulfuric acid, and subsequent distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Perfumes.
Railroad shipping regulations: None.*

Terra Alba.
A name rather loosely applied to a number of white or grayish-white substances which include ground gypsum, kaolin, burnt alum, magnesia, calcium sulfate and pipe clay. According to a ruling of the Board of General Appraisers, genuine terra alba is an almost pure calcium sulfate, ground and bolted.
Railroad shipping regulations: None.*

Terra Blanche. See Chalk.

Terra-cotta Clay. See under Clays.

Terra di Siena.
A Sienna (q.v.) found in Cyprus and various parts of Italy.
Uses: Pigment.

Terra Japonica. See Catechu and Gambir.

Terra Ponderosa. See Blanc fixe.

Terra Rosa.
A variety of red hematite (q.v.) used as a pigment.

Terra Silicea. See Diatomaceous earth.

Terra Verde. See Earths, green.

Terre Verte. See Earths, green.

Tertiary Calcium Phosphate. See Calcium phosphate, tribasic.

Tertiary Tributyl Alcohol. See Chloretone.

Tetraäminoditolylmethane $C_{15}H_{20}N_4$.
Color and properties: White crystalline powder.
Constants: M.p. 195°C.
Insoluble in water.
Derivation: Condensation of meta-tolylenediamine and formaldehyde.
Method of purification: None
Grades: Technical.
Containers: Wooden barrels.
Uses: Intermediate for dyes.
Railroad shipping regulations: None.*

Tetrabromofluorescein. See Eosin.

Tetrabromopyrocatechol-bismuth. See Noviform.

Tetrachloroethane. See Acetylene tetrachloride.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Tetrachloroethene. See Tetrachloroethylene.

Tetrachloroethylene (Carbon bichloride; Tetrachloroethene; Carbon dichloride) CCl_2CCl_2.
Color and properties: Colorless liquid; ether-like odor.
Constants: Sp.gr. 1.6080; m.p. −19°C.; b.p. 118.5°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the treatment of pentachloroethane with alkali.
Method of purification: Distillation.
Grades: Technical.
Containers: Iron drums.
Uses: Organic preparations; solvent; pharmaceuticals; dry cleansing soaps; detersive compounds.
Railroad shipping regulations: None.*

Tetrachloroethylene Dichloride. See Carbon trichloride.

Tetrachloromethane. See Carbon tetrachloride.

Tetrachlorophthalic Acid $C_6Cl_4(CO_2H)_2$.
Color and properties: Colorless, crystalline plates.
Soluble in hot water; sparingly soluble in cold water.
Derivation: By passing a stream of chlorine through a mixture of phthalic anhydride and antimony pentachloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes; intermediates.
Railroad shipping regulations: None.*

Tetrachloroquinone. See Chloranil.

Tetradymite (Telluric bismuth; Bismuth tritelluride) Bi_2Te_3, some replacement by sulfur, the formulas usually corresponding to (1) $Bi_2(Te, S)_3$, (2) Bi_2Te_2S or (3) $2Bi_2Te_3.Bi_2S_3$. Traces of selenium and gold are also often present.
Color and properties: Pale steel-gray mineral with gray streak, metallic luster. Formula 1 contains 51.51% Bi, 48.50% Te. Formula 3 59.98% Bi, 35.35% Te, 4.35% S. Occurs in gold-quartz veins or embedded in massive quartz.
Soluble in nitric acid.
Constants: Sp.gr. 7.09 to 7.64; hardness 1.5 to 2.
Occurrence: United States (Virginia, North and South Carolina, Georgia, Montana, Arizona), Hungary, Norway, Australia, Bolivia, Wales.
See also Wehrlite, Joseïte, Grünlingite.

Tetraethyl Lead $Pb(C_2H_5)_4$.
Color and properties: Colorless liquid; pleasant characteristic odor.
Constants: Molecular weight 323.36; sp.gr. 1.65; b.p. 198 to 202 (calculated); decomposes at 125 to 150°C.
Soluble in all organic solvents. Insoluble in water and dilute acids or alkalis.
Derivation: Derived by the action of ethyl halides on the various alloys of sodium and lead. Made commercially by treating PbNa with C_2H_5Cl.
Method of purification: Careful and repeated steam distillation and drying over $CaCl_2$.
Grades: One grade only—approximately 98% pure.
Containers: At present tetraethyl lead is not being transported from the dye works. May be shipped in tight metal containers.
Uses: Used for preventing knocking in internal combustion engines; certain ethylation operations.
Railroad shipping regulations: Class B poison.

Tetrahedrite.
A variety of fahlore (q.v.).
Color and properties: Light steel to dark lead-gray or iron-black; streak, black or reddish-brown; metallic luster; contains 30.56% to 45.39% copper, 27.73% to 28.85% antimony, 23.15% to 24.48% sulfur, some iron, zinc, lead, bismuth. Decomposed by nitric acid.
Constants: Sp.gr. 4.4 to 5.1; hardness 3 to 4.
Occurrence: United States (Arkansas, Colorado, Nevada, Utah, Arizona, Montana), Canada, England, Germany, Bohemia, Austria, Hungary, Mexico, Chile, Bolivia.
Uses: Important ore of copper.

Tetrahydrofurfuryl Alcohol (Tetrahydrofuryl carbinol) $C_4H_7OCH_2OH$.
Color and properties: Colorless liquid of mild, pleasant odor.
Soluble in all proportions in water, alcohol and ether. This compound remains colorless indefinitely which distinguishes it from most other furfural derivatives. It has a very high dilution coefficient for diluents such as toluene, gasoline, etc.
Constants: B.p. 177° to 178°C.; sp.gr. 1.0514 (20°/20°C.); refractive index 1.4508.
Derivation: Catalytic hydrogenation of furfural or furfuryl alcohol.
Grades: Technical; refined.
Containers: Bottles.
Uses: Exceptionally good solvent for cellulose esters, ethers and a number of varnish gums.
Railroad shipping regulations: None.*

Tetrahydrofuryl Carbinol. See Tetrahydrofurfuryl alcohol.

Tetrahydronaphthalene (Tetralin) $C_{10}H_{12}$.
Color and properties: Colorless liquid; pungent odor.
Constants: Sp.gr. 0.981 (13°C.); b.p. 205°C.; weight per gal. approximately 8 lbs.
Insoluble in water; soluble in alcohol and ether.
Derivation: Hydrogenation of naphthalene in the presence of a catalyst at 150°C.
Grades: Technical.
Containers: 1, 2, 5, 10, 50 gal. drums.
Uses: Solvent of waxes, resins, rubber, naphthalene, etc.; removing printing ink from paper; turpentine substitute; purifying coal gas; extracting sulfur from spent oxide in gas purification.
Railroad shipping regulations: None.*

Tetrahydro-para-methyloxyquinoline. See Thalline.

Tetrahydroxyflavenol. See Quercitin.

Tetraiodofluorescein. See Iodeosin.

Tetraiodophenolphthalein. See Nosophen.

Tetraiodophenolphthalein, Sodium Salt $Na_2C_{20}H_8O_4I_4.3\frac{1}{2}H_2O$.
Color and properties: Blue crystals.
Constants: Iodine content 55%.
Soluble in water and alcohol.
Derivation: From phenolphthalein and iodine in alkaline potassium iodide.
Method of purification: Recrystallization.
Grades: C.P.; N.N.R.
Containers: Glass bottles.
Uses: Gall bladder radiography. See also Nosophen.
Railroad shipping regulations: None.*

Tetralin. See Tetrahydronaphthalene.

Tetralite. See Tetryl.

Tetramethylbenzene, Symmetrical. See Durene.

Tetramethyldiaminobenzhydrol (Tetramethyldiaminodiphenylcarbinol; Michler's hydrol; Hydrol) $(CH_3)_2NC_6H_4CH(OH)C_6H_4N(CH_3)_2$.
Color and properties: Colorless prisms; forms a colorless solution in ether or benzene and a blue one in alcohol or acetic acid.
Constants: M.p. 96°C.
Soluble in alcohol, ether, benzene and acetic acid.
Derivation: By the reaction of tetramethyldiaminodiphenylmethane, hydrochloric acid and glacial acetic acid, oxidized with lead peroxide.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Tetramethyldiaminobenzophenone (Michler's ketone) $CO[C_6H_4N(CH_3)_2]_2$.
Color and properties: Yellowish-white, glittering, crystalline leaflets.
Constants: M.p. 174°C.; b.p.: Decomposes at 360°C.
Soluble in alcohol and ether.
Derivation: By passing carbonyl chloride gas into dimethylaniline at ordinary temperature, until the latter has increased in weight by 40%.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Tetramethyldiaminodiphenylcarbinol. See Tetramethyldiaminobenzhydrol.

Tetramethyldiaminodiphenylmethane $H_2C[C_6H_4N(CH_3)_2]_2$.
Color and properties: Yellowish leaflets or glistening plates.
Constants: M.p. 90° to 91°C.; b.p. 390°C.
Derivation: By heating dimethylaniline with hydrochloric acid and formaldehyde.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

1:2:6:6-Tetramethyl-4-mandeloxypiperidine Hydrochloride (Eucatropine; Euphthalmine).
Color and properties: White, granular powder; odorless.
Constants: M.p.: Above 183°C.
Grades: N.N.R.
Soluble in water, alcohol, chloroform; insoluble in ether.
Uses: Medicine (mydriatic, unofficial).
Railroad shipping regulations: None.*

Tetranitroaniline (T.N.A.).
A nitration product of aniline. Used in the manufacture of detonators and primers.
Fire hazard: Dangerous.*
Railroad shipping regulations: High explosive.

Tetraoxydiphenyl. See Diresorcinol.

Tetraoxydiphosphoaminodiarsenobenzene. See Galyl.

Tetraoxyphthalophenone Anhydride. See Fluorescein.

Tetraphosphorus Trisulfide. See Phosphorus sesquisulfide.

Tetroxalene. Trade name for a product stated to be a powerful detergent and penetrant for textiles and a concentrated scouring and cleansing agent for laundry work.

Tetryl (Tetralite).
Common commercial names for trinitrophenylmethylnitramine. An explosive used in detonators; also as a "priming" or intermediary detonating agent for less sensitive high explosives.
Fire hazard: Dangerous.*
Railroad shipping regulations: High Explosive.

Tetterwort. See Chelidonium and Sanguinaria.

"Textase." A proprietary name for a diatase compound.

Thalline (Tetrahydro-para-methyloxyquinoline) $C_9H_6H_4N(OCH_3)$.
Color and properties: White crystalline powder.
Soluble in water, alcohol, ether.
Derivation: Reaction of para-aminoanisole, para-nitroanisole, glycerol and sulfuric acid, to form para-quinanisole, followed by reduction with tin and hydrochloric acid.
Uses: Medicine (in form of sulfate and tartrate as antipyretic and depressant).
Railroad shipping regulations: None.*

Thallium Tl.
Color and properties: Bluish-white, lead-like metal.
Constants: Sp.gr. 11.85; m.p. 302°C.; b.p. 1,280°C.
Soluble in nitric and sulfuric acids; insoluble in water.
Derivation: By heating thallium iodide with metallic sodium.
Grades: Technical.
Containers: Glass bottles.
Uses: Thallium salts.
Railroad shipping regulations: None.*

Thallium Acetate.
Color and properties: White deliquescent crystals.
Soluble in water, alcohol.
Uses: Medicine (in treatment of night sweats, unofficial).
Railroad shipping regulations: None.*

Thebaine (Para-morphine) $C_{19}H_{21}NO_3$.
Color and properties: White, crystalline alkaloid; very poisonous!
Constants: M.p. 193°C.
Slightly soluble in water, alcohol and ether.
Derivation: From opium.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Thebaine Hydrochloride $C_{19}H_{21}NO_3.HCl.H_2O$.
Color and properties: Large rhombic prisms.
Soluble in water, alcohol and ether.
Derivation: By the action of hydrochloric acid on thebaine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Theine. See Caffeine.

Thenardite Na_2SO_4.
A natural anhydrous sulfate of sodium. White to brownish in color.
Occurrence: United States (Arizona, California), Central Asia, Chile, Spain, Germany.

Thénard's Blue. See Cobalt blue.

Theobroma Oil. See Cacao butter.

Theobroma Shells. See Cacao shells.

Theobromine (3:7-Dimethylxanthine) $C_7H_8N_4O_2$.
Color and properties: White, crystalline powder; poisonous!
Constants: M.p. 329°C.
Soluble in chloroform; insoluble in water, alcohol and ether.
Derivation: By extraction from the seeds of the Theobroma cacao.
Method of purification: Crystallization.
Grades: Technical.
Containers: 1 lb. cans; 1 lb. bottles.
Uses: Medicine (in the form of its sodium salt mixed with sodium salicylate (U.S.P.) to increase the secretion of urine or to stimulate the voluntary muscles).
Railroad shipping regulations: None.*

Theobromineacetylsalicylate. See Theocyl.

Theobromine-barium-sodium Salicylate. See Barutin.

Theobromine Lithium. See Theobromose.

Theobromine-lithium Benzoate. See Uropherin B.

Theobromine-lithium Salicylate. See Uropherin S.

Theobromine-sodium Acetate (Agurin; Theonacet) $C_7H_7O_2N_4Na.NaC_2H_3O_2$.
Color and properties: White crystalline powder; odorless, bitter taste. Contains not less than 63% theobromine. Incompatible with carbonated beverages, acids, saccharin, mucilaginous liquids, alkaloids.
Soluble in cold water; slightly soluble in cold alcohol, more soluble in hot alcohol.
Uses: Medicine (diuretic, unofficial).
Railroad shipping regulations: None.*

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Theobromine-sodium Citrate. See Urocitral.

Theobromine-sodium Formate. See Theophorin.

Theobromine-sodium Lactate. See Theolactin.

Theobromine-sodium Salicylate (Theonasal; Diuretin).

Color and properties: White powder; odorless; sweet, saline, alkaline taste. Contains not less than 46.5% theobromine and 35% salicylic acid when dried to constant weight at 110°C. Slowly absorbs carbon dioxide from the air, liberating theobromine.

Soluble in water; slightly soluble in alcohol.

Derivation: By combining theobromine, sodium hydroxide and sodium salicylate in molecular proportions.

Grades: U.S.P.

Containers: 1 lb. bottles.

Uses: Medicine (diuretic).

Railroad shipping regulations: None.*

Theobromose (Theobromine lithium) $C_7H_7O_2N_4Li$.

Color and properties: Fine needle-like crystals.

Soluble in water.

Uses: Medicine (diuretic, unofficial).

Railroad shipping regulations: None.*

Theocyl (Theobromine acetylsalicylate) $C_7H_8O_2N_4C_9H_8O_4$.

Color and properties: White crystalline powder; nonirritant; insoluble in water; soluble in alcohol.

Uses: Medicine (diuretic, unofficial).

Railroad shipping regulations: None.*

Theoform. A condensation product of theobromine and formaldehyde used in medicine. Unofficial.

Railroad shipping regulations: None.*

Theolactin (Theobromine-sodium lactate).

Color and properties: White alkaline powder; hygroscopic. Decomposed by carbon dioxide of the air.

Soluble in water.

Uses: Medicine (diuretic, unofficial).

Railroad shipping regulations. None.*

Theonacet. See Theobromine-sodium acetate.

Theonasal. See Theobromine-sodium salicylate.

Theophorin (Theobromine-sodium formate) $NaC_7H_7O_2N_4NaCHO_2.H_2O$.

Color and properties: White, alkaline powder; bitter taste. Containing 62.5% theobromine. More irritant than other bromine salts.

Soluble in water.

Uses: Medicine (diuretic, unofficial).

Railroad shipping regulations: None.*

Theophylline (1:3-Dimethylxanthine) $C_7H_8N_4O_2.H_2O$.

Color and properties: White crystalline alkaloid; poisonous!

Constants: M.p. 269° to 272°C.

Slightly soluble in water and alcohol.

Derivation: (1) By extraction from tea leaves; (2) synthetically from ethyl cyanoacetate.

Method of purification: Crystallization.

Grades: Technical; U.S.P.

Containers: Glass bottles.

Uses: Medicine (in the form of a compound with ethylenediamine or sodium acetate, formate or salicylate, in effect similar to theobromine salts).

Railroad shipping regulations: None.*

Theophyllineethylenediamine. See Euphyllin.

Thermit. Proprietary name for a product stated to be a mixture of equal parts of iron oxide and finely divided aluminum used in welding iron and steel, and for incendiary bombs in the late war.

Thermlo F. Trade name for a rubber accelerator.

Thermodin (Phenacetinurethane). $C_2H_5OC_6H_4N(COOC_2H_5)COCH_3$.

Color and properties: Colorless, crystalline powder.

Constants: M.p. 86° to 88°C.

Uses: Medicine (antipyretic, unofficial).

Railroad shipping regulations: None.*

Thermonatrite $Na_2CO_3.H_2O$.

A natural hydrous sodium carbonate occurring in soda lakes and as an efflorescence over the soil in many dry regions.

Thiacetic Acid. See Thioacetic acid.

Thickened Oils. See Blown oils.

Thigenol.

Color and properties: Dark brown liquid, faint sulfur-like odor. A solution of sodium salts of synthetic sulfo-oleic acids, containing 2.85% sulfur. Incompatible with hard water, mineral acids.

Soluble in distilled water, dilute alcohol, glycerol, oily or fatty bases, chloroform.

Derivation: Sulfur is dissolved in boiling glyceride of oleic acid, subjected to the action of sodium hydroxide and the solution evaporated in vacuo until it has a sp.gr. of 1.05 to 1.06.

Uses: Medicine (skin diseases, unofficial).

Railroad shipping regulations: None.*

Thioacetic Acid (Thiacetic acid; Ethanethiolic acid) CH_3COSH.

Color and properties: Clear liquid; pungent, acetic and hydrogen sulfide odor.

Constants: Sp.gr. 1.074; m.p. —17°C.; b.p. 93°C.

Soluble in water, alcohol and ether.

Derivation: By heating glacial acetic acid and phosphorus pentasulfide, with subsequent distillation.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles.

Uses: Chemical reagent.

Railroad shipping regulations: None.

Thiocarbamide (Thiourea; Sulfourea) CH_4N_2S.

Color and properties: White, lustrous crystals; bitter taste.

Constants: Sp.gr. 1.406; m.p. 180°C.; b.p.: Sublimes in vacuo at 150° to 160°C.

Soluble in cold water, ammonium sulfocyanide solution and ether; almost insoluble in cold alcohol.

Derivation: By heating dry ammonium sulfocyanide, extraction with a concentrated solution of ammonium sulfocyanide, with subsequent crystallization.

Method of purification: Sublimation in vacuo.

Grades: Technical.

Containers: Wooden boxes.

Uses: Photography; organic synthesis (intermediates, dyes, drugs).

Railroad shipping regulations: None.*

Thiocarbanil. See Phenylmustard oil.

Thiocarbanilide $CS(NHC_6H_5)_2$.

Color and properties: Colorless, crystalline tablets.

Constants: Sp.gr. 1.3205; m.p. 154°C.

Soluble in alcohol and ether; insoluble in water.

Derivation: By the interaction of aniline and carbon bisulfide.

Grades: Technical.

Containers: 200, 400 lb. barrels.

Uses: Intermediates; dyes (sulfur colors, indigo, methyl indigo); vulcanization accelerator; synthetic organic pharmaceuticals.

Railroad shipping regulations: None.*

Thiocarbonyl Chloride (Thiophosgene) $CSCl_2$.

Color and properties: Reddish liquid; irritating odor. On keeping is converted into colorless crystals of the polymeric compound which melts at 113°C.

Constants: Sp.gr. 1.5085; b.p. 74°C.

Soluble in alcohol and ether.

Derivation: By passing chlorine into carbon bisulfide with subsequent steam distillation. The product is converted into thiocarbonyl chloride by reduction with iron and acetic acid.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Thiocol. See Potassium guaiacol sulfonate.

Thioform. See Bismuth dithiosalicylate.

Thiol.
Color and properties: Thin dark brown liquid or (evaporated to a) powder.
Constants: Liquid: Sp.gr. 1.082 to 1.089.
Slightly soluble in glycerol.
Derivation: By treating paraffin oils of 0.89 to 0.90 sp.gr. with sulfur at high temperature. The unsaturated hydrocarbons are recovered by solvent extraction, subjected to the action of concentrated sulfuric acid at low temperature and separation of thiol effected by the presence of ice.
Uses: Medicine (odorless substitute for ichthyol, inflammations, eczema, syphilitic ulcers, sprains, rheumatism, sciatica, unofficial).
Railroad shipping regulations. None.*

Thiophosgene. See Thiocarbonyl chloride.

Thiourea. See Thiocarbamide.

Thistle Saffron. See Carthamus.

Thomas Balsam. See Tolu balsam.

Thomas Metal. See Basic slag.

Thomas Phosphate. See Basic slag.

Thomas Slag. See Basic slag.

Thomsonite. See Zeolites.

Thorianite. A complex mineral of uncertain composition, but consisting in the main of thorium, uranium and cerium oxides.
Occurrence: United States (Montana); Ceylon.

Thorite.
A natural thorium silicate, usually hydrated. Color, black or orange-yellow (orangite).
Constants: Sp.gr.: Black 4.5 to 5. Orange-yellow 5.19 to 5.40.
Occurrence: United States (New York, New Jersey), Norway, Scotland.

Thorium Th.
Color and properties: Gray, heavy, infusible powder.
Constants: Sp.gr. 11.00 to 11.23; m.p. above 1,700°C.
Soluble in acids; insoluble in alkalis and water.
Derivation: By heating the double chloride or fluoride of thorium and potassium with metallic sodium or potassium.
Grades: Technical.
Containers: Wooden kegs.
Uses: Thorium compounds.
Railroad shipping regulations: None.*

Thorium Anhydride. See Thorium dioxide.

Thorium Dioxide (Thorium anhydride; Thorium oxide) ThO_2.
Color and properties: Heavy, white powder.
Constants: Sp.gr. 9.876.
Soluble in sulfuric acid; insoluble in water.
Derivation: By the reduction of thorium nitrate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Incandescent gas mantles.
Railroad shipping regulations: None.*

Thorium Nitrate $Th(NO_3)_4.12H_2O$.
Color and properties: White, crystalline mass.
Soluble in water and alcohol.
Derivation: By extraction from monazite sand.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden kegs.
Uses: Incandescent gas mantles.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Thorium Ore. See Monazite.

Thorium Oxide. See Thorium dioxide.

Thorn Apple. See Stramonium.

Thorogummite. A natural, hydrous silicate of uranium and thorium $UO_3.ThO_2.3SiO_3.6H_2O$. Found in Texas.

Thoroughwort. See Eupatorium.

Thread-cutting Oil.
Generally engine oil (q.v.) compounded with pure lard oil or cottonseed oil. A mixture of 60 to 80% engine oil and 20 to 40% lard oil is stated to be satisfactory. 27°Bé paraffin oil compounded with 25% cottonseed oil is often used.
Railroad shipping regulations. None.*

Three-leaved Ivy. See Rhus toxicodendron.

Throat Balls. See Niter balls.

Thuja (Arbor vitae; White cedar)
Dried leafy twigs of Thuja occidentalis.
Habitat: Northern and central United States.
Grades: N.F.
Uses: Source of thuja oil.

Thuja Oil.
Color and properties: Pale yellow liquid; characteristic, rather agreeable odor.
Chief known constituents: Dextro-pinene; levofenchone; thujone.
Constants: Sp.gr. 0.915 to 0.925.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: Distilled from the leaves of the white cedar, Thuja occidentalis.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine (treatment of worms).
Railroad shipping regulations: None.*

Thulia. See Thulium oxide.

Thulite. See Zoisite.

Thulium Tm.
One of the rare earth (q.v) metals.

Thulium Oxalate $Tm_2(C_2O_4)_3.6H_2O$.
Color and properties: Greenish-white precipitate.
Soluble in aqueous alkali oxalates.
Railroad shipping regulations: None.*

Thulium Oxide (Thulia) Tm_2O_3.
Color and properties: Dense white powder with greenish tinge. Exhibits a reddish incandescence on heating, changing to yellow and then white on prolonged heating.
Slowly soluble in strong acids.
Derivation: By ignition of thulium oxalate.
Railroad shipping regulations: None.*

Thus, American. See Turpentine.

Thus Gum (Frankincense gum).
A resin from the tree, Boswellia carterii, and other species of Boswellia.
Habitat: Nubia, Egypt and Somaliland.
Grades: Technical.
Containers: Kegs.
Uses: Pharmacy; incense; fumigating preparations; perfumery.
Railroad shipping regulations: None.*

Thyme.
Derivation: The dried leaves and flowering tops of Thymus vulgaris.
Habitat: Southern Europe; cultivated in England and United States.
Grades: Technical; N.F.
Containers: Bags; bales.
Uses: Source of thyme oil; flavoring.
Railroad shipping regulations: None.*

Thyme Camphor. See Thymol.

Thyme Oil, Cyprian.
This is really an origanum oil (q.v.).

Thyme Oils.
Essential oils distilled from various species of the genus Thymus. The French product is obtained

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

from Thymus vulgaris, L., and the Algerian from Thymus algeriensis. The Spanish species is not commonly known and it is thought that more than one species may be used.

Chief constituents: Thymol, carvacrol, cymene, linalool, borneol.

Adulteration: Turpentine, which lowers the specific gravity below 0.900, diminishes the solubility in alcohol and lowers the phenol content. The adulterated product is sometimes known as white thyme oil.

For characteristics of these oils see under the geographical origin.

French.

Color and properties: Dark, reddish-brown; strong thyme odor; pungent taste. Phenol content 20 to 30% (mostly thymol, sometimes carvacrol or a mixture of both).

Constants: Sp.gr. 0.905 to 0.915 (15°C.); optical rotation up to —4° (mostly undeterminable on account of dark color).

Solubility in alcohol: In ½ vol. of 90% alcohol; in 1 to 2 vol. of 80% alcohol; in 15 to 30 vol. of 70% alcohol.

Spanish.

Color and properties: Dark green; strong thyme odor; pungent taste. Two varieties are known: (a) Phenol content 50 to 74% consisting exclusively of carvacrol. (b) Phenol content 20 to 53% consisting exclusively of thymol.

Constants: (a) Sp.gr. 0.930 to 0.956 (15°C.); optical rotation +1° 30′ to —3°, mostly levogyrate; refractive index 1.504 to 1.510. (b) Sp.gr. 0.909 to 0.940; optical rotation —0° 25′ to —8° 20′; refractive index 1.491 to 1.499.

Solubility in alcohol: (a) In 2 to 3 vols. of 70% alcohol. (b) In 2 to 4 vols. and more of 80% alcohol.

Wild.

Color and properties: Colorless or golden-yellow; agreeable melissa-like aroma, with a slight odor of thyme.

Constants: Sp.gr. 0.890 to 0.920 (15°C.); optical rotation —10° to —21°.

Solubility in alcohol: In 1.15 vols. of 80% alcohol.

Containers: Bottles; tins; drums.

Uses: Perfumery; cosmetics; toilet soaps; flavoring; medicine.

Railroad shipping regulations: None.*

Thymegol.

Mercuric potassium thymol sulfonate used in medicine as a germicide and a source of mercury. Unofficial.

Railroad shipping regulations: None.*

Thymene. A mixture of cymene and several terpenes found in ajowan oil.

Used as soap perfume.

Railroad shipping regulations: None.*

Thymic Acid. See Thymol.

Thymiode. See Thymol iodide.

Thymiodol. See Thymol iodide.

Thymodin. See Thymol iodide.

Thymol (Isopropyl-meta-cresol; Thyme camphor; Thymic acid; Methypropylphenol; Propyl metacresol, para-) $(CH_3)_2CHC_6H_3(CH_3)OH$.

Color and properties: Colorless crystals with aromatic odor and taste.

Constants: Sp.gr. 0.979; m.p. 49°C.; b.p. 231.8°C.

Soluble in alcohol, carbon bisulfide, chloroform, glacial acetic acid, ether and fixed or volatile oils; slightly soluble in water and glycerol.

Derivation: From ajowan-seed oil or horse-mint oil by treatment with caustic soda and decomposition of the sodium salt with hydrochloric acid.

Grades: Technical; U.S.P.

Containers: 1 lb. bottles; 1, 5, 25 lb. tins; 50 lb. cases.

Uses: Medicine (antiseptic and vermifuge); perfumery; thymol compounds; microscopy; preservative; embalming.

Railroad shipping regulations: None.*

Thymol Iodide (Annidalm; Aristol; Diïododithymol; Dithymoldiodide; Iodistol; Iodohydromol; Iodosol; Iodothymol; Thymiodol; Thymotol) $C_6H_2(CH_3)(OH)(C_3H_7)I$.

Constants: M.p. 69°C.

Color and properties: Red-brown powder or crystals.

Soluble in ether, chloroform and fixed or volatile oils; slightly soluble in alcohol; insoluble in water.

Derivation: By the interaction of thymol and potassium iodide in alkaline solution.

Grades: Technical; U.S.P.

Containers: 1 lb. bottles; 5, 25 lb. boxes; 50 lb. kegs; 100 lb. barrels.

Uses: Medicine (dusting powder for wounds and skin diseases).

Railroad shipping regulations: None.*

Thymoloform. A condensation product of formaldehyde and thymol used in medicine. Unofficial.

Railroad shipping regulations: None.*

Thyroid.

Color and properties: Yellow, amorphous powder with slight, characteristic odor.

Derivation: Dried, cleaned, powdered thyroid gland obtained from domesticated animals.

Uses: Medicine, U.S.P. (in treating obesity).

Thyroxine. The active principle of the thyroid gland. In "Thyroxine," New York, Chemical Catalog Co., Inc., 1929, Kendall identifies it as a tetra-iodo derivative of oxyphenyltyrosine.

Tiemannite HgSe.

Color and properties: Steel-gray to blackish lead-gray mineral; metallic luster; nearly black streak; contains 71.7% mercury, 28.3% selenium.

Constants: Sp.gr. 7.1 to 8.5; hardness 2.5.

Occurrence: United States (Utah), Germany, Argentine.

Tiff. See Barytes.

Tiger's Eye.

A pseudomorph of quartz (q.v.) and limonite (q.v.) after crocidolite (q.v.). Color and properties: Golden or tawny yellow; luster, silky. Sometimes erroneously referred to in commercial fields as crocidolite.

Uses: Ornamental stone.

Tiglic Acid (Methylcrotonic acid; Crotonolic acid) $CH_3CHC(CH_3)CO_2H$.

Color and properties: Thick, syrupy liquid or colorless crystals; very poisonous!

Constants: Sp.gr. 0.9641; m.p. 65°C.; b.p. 198.5°C.

Soluble in alcohol and ether; slightly soluble in water.

Derivation: Obtained from croton oil, which is extracted from seeds of Croton tiglium.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Railroad shipping regulations: None.*

Tiglium (Croton; Purging croton; Molucca grains; Grana tilli).

Color and properties: Ovoid seed, reddish-brown when fresh, turning grayish-brown with age.

Chief constituents: Croton oil; tiglic acid; crotonol.

Derivation: The seed of Croton tiglium; habitat: East Indies and Philippines.

Grades: Technical.

Containers: Bags; boxes.

Uses: Medicine; source of croton oil.

Railroad shipping regulations: None.*

Tiglium Oil. See Croton oil.

Til Oil. See Sesamé oil.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Tile Ore. See Cuprite.

Tilia. See Linden.

Tin (Stannum) Sn.

Color and properties: Silver-white, ductile metal.

Constants: Sp.gr. 7.298; m.p. 232°C.; b.p. 1,450° to 1,600°C.

Soluble in acids, and hot potassium hydroxide solution; insoluble in water.

Derivation: By roasting the ore (cassiterite) to oxidize sulfates and to remove arsine, then reducing with coal in a reverbatory furnace, or by smelting in an electric furnace. The tin of commerce comes chiefly from Straits Settlements, Bolivia and Nigeria.

Grades: Pig (99%); Straits. Sold by brands indicative of the ore from which the tin was smelted. Block tin is a common designation for pure tin.

Uses: Tin plate; terne plate; solder; Babbit metal; brass and bronze; foil; collapsible tubes; tinning and retinning; white, type and casting metal; manufacture of chemicals; tinned wire (all copper wire which is to be rubber covered). Block tin is used in coating copper vessels for culinary purposes. It is also used for coating lead sheet or lining lead pipe for distilled water and some chemicals.

Railroad shipping regulations: None.*

Note: In speaking of fabricated articles "tin" is often incorrectly used when tin-plate (thin sheets of iron coated with tin) is meant, e.g. "a tin can." To distinguish, articles (such as condenser coils) actually made of solid tin are said to be made of "block tin." See also Block tin lining.

Tin Anhydride. See Stannic anhydride.

Tin Ash. See Stannic anhydride.

Tin Bichloride. See Stannous chloride.

Tin Bisulfide. See Stannic sulfide.

Tin Bronze. See Stannic sulfide.

Tin, Butter of. See Stannic chloride.

Tin Chloride. See Stannic chloride.

Tin Chromate. See Stannic chromate and Stannous chromate.

Tin Crystals. See Stannous chloride.

Tin Dichloride. See Stannous chloride.

Tin Dioxide. See Stannic anhydride.

Tin Disulfide. See Stannic sulfide.

Tin, Dropped. See Tin, grain.

Tin, Flowers of. See Stannic anhydride.

Tin, Grain (Tin, dropped).

Color and properties: Prismatic fragments; usually a very pure tin.

Derivation: Tin is heated until brittle, hammered, and then dropped from a height.

Tin Oxymuriate. See Stannic chloride.

Tin Ore. See Cassiterite.

Tin Oxalate. See Stannous oxalate.

Tin Oxide. See Stannic anhydride and Stannous oxide.

Tin Oxymuriate. See Stannic chloride.

Tin Peroxide. See Stannic anhydride.

Tin Phosphide. See Stannic phosphide.

Tin Plate.

Tin plate consists of sheet steel coated with pure tin. The function of the tin coating is both to protect and to beautify the steel base sheet. Also it facilitates soldering.

According to Shannon ("Sheet Steel and Tin Plate," New York. Chemical Catalog Co., Inc., 1930) "tin plates are made with different amounts of tin coating. Those grades carrying the least tin coating are called 'Cokes' and those carrying the most coating are called 'Charcoals.'

In the early days of the industry, the better grades of tin plate (i.e., those bearing the heavier tin coatings) were made with base sheets of charcoal iron, and the cheaper grades with base sheets of coke iron. Nowadays, however, all tin plates are made from mild, soft steel so that the words 'Cokes' and 'Charcoals' have lost their original significance, so far as the base sheet is concerned, but they still designate a difference in the amount of tin coating."

Varieties:

"Cokes" (*Standard Coke Tin Plate*).

Characteristics: Cheapest tin plate made; carries the lightest tin coating consistent with thorough coating of the base steel sheet. Ordinarily made in gages No. 16 to No. 38 (55 lb. base weight) inclusive; principally in base weights from 135 lb. to 80 lb., inclusive.

General applications and typical uses: Tin cans to contain preserved food. Also, gasoline and oil cans; numerous varieties of cans and boxes for coffee, tea, tobacco, candy, etc., bottle caps; various articles and parts where the bright, non-poisonous and easily soldered tin coating is desired. For lithographing and decorating.

"Best Cokes."

Characteristics: Tin coating heavier than on standard cokes.

General applications and typical uses: Where slightly better grade than standard cokes is needed.

"Special Cokes."

Characteristics: Heavier coating than "best cokes," but not so heavily coated as "1A charcoals."

General applications and typical uses: Where a grade intermediate between "best cokes" and "1A charcoals" is required.

"Charcoals."

Characteristics: The amount of tin coating on charcoals is heavier than on any coke grade. 1A has the least coating, 2A has more, and so on through 3A, 4A, 5A and 6A.

General applications and typical uses: Where a very bright, extra good quality tin plate is required, as for special cans, boxes, gas meters, lanterns.

Estimated Distribution of Tin Plate in 1929†

	Per Cent
Automobile and parts manufacturers....	1.9
Furniture and stove manufacturers....	0.7
Metal containers	74.5
Pressed and formed metal manufacturers	0.2
Oil, gas and water companies..........	1.3
Machinery and hand tools............	0.1
Jobbers and warehouses..............	2.8
Miscellaneous	5.3
Exports	13.2
	100.00

† These figures are based on an estimate of shipments of black plate for tinning according to "Iron Age" for Jan. 2, 1930.

Weight of Coating: "Tin plates are never sold on the basis of the actual weight of coating, but always on the basis of recognized and established standards for the several coatings.

Unit of Measure: "The unit of measure of tin plate in the light gages is what is called the 'base box,' which is the area represented by 112 sheets of size 14 in. x 20 in., or approximately 218 sq. ft. However, the heavier gages, i.e., No. 24 gage and heavier, are sold by weight, the same as sheet steel, as a rule.

Method of Shipment: "Practically all tin plate was shipped in wooden boxes until quite recently, when fiber boxes and some other special methods of loading were introduced. The wooden box, however, is still the standard medium of shipment and its cost is included in the base prices of tin plate.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Tin Plate Gage: "This gage is used for tin plate and short ternes. It was inherited from the English tin plate industry. It is a weight gage, but instead of employing gage numbers or weights per sq. ft., the gage is indicated by the weight of a base box in pounds, called the 'base weight.' A base box consists of the area equivalent to that contained in 112 sheets of 14 in. x 20 in., i.e., 31,360 sq. in. or 217.78 sq. ft.

Symbol	Base Weight Pound per Base Box	Equivalent in Pounds Per Square Foot	United States Standard Gage Weights Interpolated for Comparison
8X	275	1.263	
		1.250	No. 22
D 4 X	270	1.240	
8 X L	268	1.231	
7 X	255	1.171	
7 X L	248	1.139	
		1.125	No. 23
D 3 X	240	1.102	
6 X	235	1.079	
6 X L	228	1.047	
		1.000	No. 24
5 X	215	0.987	
D 2 X	210	0.964	
5 X L	208	0.955	
4 X	195	0.895	
		0.875	No. 25
4 X L	188	0.863	
D X	180	0.827	
3 X	175	0.804	
3 X L	168	0.771	
		0.750	No. 26
	163	0.748	
2 X	155	0.712	
		0.688	No. 27
2 X L	148	0.680	
	143	0.657	
D C	139	0.638	
		0.625	No. 28
I X	135	0.620	
I X L	128	0.588	
	125	0.574	
	123	0.565	
		0.563	No. 29
	118	0.542	
	112	0.514	
	110	0.505	
		0.500	No. 30
I C	107	0.491	
I C L	100	0.459	
		0.438	No. 31
	95	0.436	
	90	0.413	
		0.406	No. 32
	85	0.390	
		0.375	No. 33
	80	0.367	
	75	0.344	
		0.344	No. 34
	70	0.321	
		0.313	No. 35
	65	0.298	
		0.281	No. 36
	60	0.276	
		0.266	No. 37
	55	0.253	
		0.250	No. 38

"By '107 lb. base weight' is meant: tin plate of such weight per sq. ft. that 217.78 sq. ft. of it will weigh 107 lbs. Certain base weights have symbols to indicate them. For example: 1C means '107 lb. per base box.'

"The equivalent weights per square foot of these base weights are given in the accompanying table, and the nearby United States Standard Gage weights are interpolated for comparison.

Coke Tin Plate:

"Coke tin plate constitutes, by far, the major portion of the tin plate produced. It is used for most of the tin cans, tin boxes, and the thousands of other uses to which tin plate is put. Although the amount of tin carried by standard coke tin plates actually is very small, modern tinning methods distribute it so evenly and thoroughly over the steel sheets that for most purposes it is ample protection and more would be superfluous.

"For tinning, the steel base sheet is required to have a very smooth, polished surface for two reasons: first, to conserve tin, since a rough, porous steel surface would absorb more coating; and second, to permit the coating to adhere to the sheet evenly and smoothly, thereby producing the high gloss required in the tinned sheet.

"The manufacture of coke tin plate consists, briefly, of the following operations: hot-rolled sheets of steel are (1) *pickled* to remove surface oxide produced in hot-rolling; (2) *annealed* in closed boxes to soften the sheets which are relatively stiff after hot-rolling; (3) *cold rolled* three passes to smooth and polish the steel surface; (4) *box-annealed* again at lower temperature to eliminate the stiffness imparted by the cold-rolling; (5) *pickled* again to remove the light oxide from the second annealing; (6) *tinned* by being conducted through the tinning pot † by means of rolls and guides, during the course of which the sheets pass in succession through a flux of zinc and ammonium chloride floating on the molten tin, then through the bath of molten tin, then through several sets of rolls running in a deep bath of palm oil heated to 475°F. by the molten tin on which it floats at the exit end of the pot, the hot palm oil keeping the tin coating molten while the rolls press off any excess and press the remaining coating evenly against the steel sheet; (7) *cleaned and polished* by passing through cloth buffing rolls which remove excess palm oil and polish the tinned surface; (8) *inspected* on both sides and assorted.

Mill Classification of Cokes:

1. *Primes*—First quality plates; free from visible coating defects and dirt; must be full size and commercially flat; also must be free from harmful defects in the steel base sheet such as blisters and heavy seams.
2. *Seconds*—(Formerly called "Wasters")—Second quality commercial plates with minor imperfections in the coating, in the base sheet, in the shape or size. Seconds can generally be used for the same purpose as the corresponding primes, provided a little extra care is exercised in utilizing them so that the small defects will not prove injurious.
3. *Waste–waste*—Third quality commercial plates, with large imperfections in the coating, in the base sheet, in the shape or size.
4. *Menders*—These are not sold, but are set aside during assorting as plates which may tin well enough for primes or seconds if run through

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† A cast-iron pot, set in brickwork for heating, containing from 5,000 lb. to 10,000 lb. of pure tin heated to about 575°F. in which is the tinning machine and on which float the flux at the entrance end and the palm oil at the exit end, separated by partitions.

* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

the pot again. After being re-run through the pot, they are assorted again.

5. *Scrap or cobbles*—These are plates which are too bad to come within any of the above classifications and therefore are scrapped for detinning.

"After having been assorted, the primes and seconds are 'reckoned,' i.e., the proper number of plates to go into a box are counted out. This number of plates is then weighed, the weight is checked against the theoretical weight and the plates are placed in the box, which is then nailed up.

Sheetage: "Ordinarily, tin plates are packed 56, 112 or 224 sheets to the package, depending upon the base weight and size.

Sizes of Cokes:

"The only standard sizes of tin plate are 14 in. x 20 in. and 20 in. x 28 in. All other sizes are odd. Jobbers and dealers carry stocks of the two standard sizes and many manufacturing operations utilizing tin plate have been adapted to these sizes. However, the bulk of tin plate is produced in odd sizes specified by buyers according to their individual needs.

"Although cokes can be made in some cases up to about 36 in. in width or in lengths up to 60 in., there is generally an extra charge for widths exceeding 28 in. and for lengths much in excess of 30 in.

Charcoal Tin Plate:

"The base plate for charcoals is prepared in exactly the same manner as for cokes. To apply the heavier coatings required on the better grades of charcoals, however, a different tinning method must be used. This includes a hand redipping in molten tin to increase the coating and is done in what is called a 'combination pot,' so called because it involves a combination of machine tinning and hand-dipping.

"In this combination process, the sheets, after the white pickling, pass through a tinning machine very similar to that used for cokes. After thus receiving a preliminary coating, they are grasped with small tongs and dipped by hand into a bath of molten tin, upon removal from which they are placed in a bath of hot palm oil. They are delivered out of this hot palm oil bath, by an arrangement of rolls, bearing the required coating for the grade of charcoals being made.

"Precautions are taken to avoid scratching or damaging the bright coating of soft tin on the coated charcoal. As the plates emerge from the oil bath, they are seized with tongs and placed on edge in a traveling cooling rack, from which they are carefully fed to a cleaning machine, emerging clean and bright (or are cleaned by hand), whereupon they are carefully stacked by hand ready for assorting.

Assorting charcoal tin plate:

"Charcoals are assorted into the same classifications as cokes, but the assorting standards are higher, of course, becoming more exacting progressively from 1A up to 6A grades. Both primes and seconds in 1A charcoal grade are higher quality than primes and seconds, respectively, in cokes, and 2A charcoals are higher quality than 1A, and so on up the list.

"The mill classification during the assorting of charcoals, however, includes an additional class which, naturally, is not included in the mill classification of cokes, namely 'Strippers.' These are imperfect charcoal plates which are to be stripped down to a lighter coating, such as cokes."

Corrosion of tin plate by foodstuffs:

Although the tin can may leave much to be desired as a perfect container for preserving foods, it is believed there is not available at the present time as good a substitute which has all the commercial features of the tin can. Mantell ("Tin, Its Mining, Production, Technology and Applications," New York, Chemical Catalog Company, Inc., 1929) states "the corrosion of tin plate containers used for food products produces at least three different types of results—first, that which is known as 'discoloration' which results in tarnishing, darkening or blackening the bright metal surface of the inside of the container; second, termed 'perforation,' which results in the formation of holes in the cans to the detriment and spoilage of the enclosed food products (it will be shown that perforation is the result of electrolytic action); and third, that which we shall term 'solution,' the result of chemical action of the food-product constituents on the metal of the container. The resulting action does not usually produce discoloration but makes itself evident in other ways. One of the most usual is termed 'etching' which is descriptive of the effect. It is not meant by this classification that these factors are entirely separate and do not occur together, but it will be shown that they may occur separately without relation to each other, if conditions are favorable; or that they may supplement each other or occur progressively."

One method of protecting tin plate from corrosion by foodstuffs is the use of C-enamel. For a complete description of the corrosion of tin plate by food products, together with a very complete list of foodstuffs and an analysis of the value of tin cans as a container for them see Mantell (loc. cit.).

Tin Plating.

Electrolytic processes.

Electrolytically deposited tin is of a dull or matte white color. It has so far not been possible to deposit tin so that it may be removed from the bath in a bright condition. Ordinarily it is necessary to scratch-brush the deposit and further polish it if it be desired to produce the same bright surface as is made when the base metal is coated by hot-dipping.* This disadvantage has often prevented the adoption of the electrolytic method for tin coating. Electro-deposited tin is soft, malleable, and very ductile. With continued deposition, the deposits tend to become more and more crystalline. The deposit is apt to become spongy, slimy, or dendritic, with little adherence. The addition of colloids to the bath allows the production of thicker deposits. These retain the ductility and characteristic softness of the metal.

The number of tin-plating baths recommended in text books, journal articles, and patent specifications has been very large. Few of them have wide application and many are worthless. According to Mantell (Tin, Its Mining, Production, Technology and Applications, New York, Chemical Catalog Co., Inc., 1929), "the alkaline tin baths, modified in a large number of ways, are practically the only ones which are commercially important. They will serve for almost any purpose to which tin plating may be applied. Ordinarily, the required thickness of a tin deposit does not exceed a fraction of a mil (0.001 inch). These deposits are usually smooth and apparently without definite structure. In their formation they have not had time to appear crystalline to the eye nor develop trees. In a number of cases comparatively thick deposits are required. An example is the coating of copper sheets for fabrication into equipment for the dairy and food industries where deposits 0.003 inch thick of an absolutely continuous nature are required. Refrigerator coils also need thick deposits. The acid tin baths proposed from time to time have lacked the necessary throwing power. A common commercial alkaline bath is: sodium stannate 28 ounces per gallon (210 grams/liter), hydrated stannic oxide 2 ounces per gallon (15 grams/liter), powdered white starch ⅛ ounce per gallon (0.9 gram/liter). Potassium resinate is used as a colloidal addition agent, being added as required to improve the character of the deposit. The bath is operated at a temperature of 160° to 180°F. (71.11° to 82.22°C.) with a current density of 25 to 40 amperes per square foot (2.5 to 4 amps./sq. dm.) at 4 to 6 volts. 30% of sheet steel anodes are used and 70% of tin. The anode efficiency is about 60% of that at the cathode. Sodium stannate and hydrated tin oxide are added at intervals to maintain the solution. Small amounts of chlorides are advantageous."

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

A large amount of experimental work has been done to improve the alkaline baths. One prominent chemical manufacturer has recently developed an alkaline sodium stannate-acetate tin bath. In addition to the present satisfactory alkaline baths, there is a number of more or less useful baths of different composition. For details see Mantell (loc. cit.).

Tin plating finds large application as a covering for copper and steel in cooking kettles for food products, iron and steel containers, refrigerator coils in machines of the electric type and in a large number of cases where decorative coverings are desired. Electro-tinning is used to deposit tin on such classes of goods as lighting fixtures, ornamental hardware, buckles, and a large number of metal objects. Often it is desired to deposit a coating on the iron, brass or other base metal which is cheaper than silver and yet can be "oxidized" or "colored." Some very beautiful effects can be produced by this method. Close inspection is required to distinguish the "finish" from that of oxidized silver. Tin has an advantage over silver in this application in that if the protective lacquer should wear off, the tin is not so readily tarnished as silver would be. An interesting use of tin plating is the application of exceedingly thin deposits on white gold jewelry to bring up the "color" and uniformity of appearance.

Non-electrolytic processes.

Large quantities of small articles such as pins, thimbles, eyelets, dress snap fasteners, chain links, safety pins, buttons and the like, are coated with tin by the contact process. This method is an immersion one, and strictly speaking is not electrolytic. The current, instead of being furnished from an outside source, arises in the tank itself. This method is applied largely for decorative purposes. The coatings are very thin but very fine-grained and bright. Unlike most deposits produced by immersion, they are decidedly adherent, with considerable resistance to corrosion. The iron concentration of tin in the baths is very low, hence the rate of deposition is slow and treeing is effectively prevented. Hydrogen has a relatively high overvoltage on tin; this aids in the production of dense impervious deposits. All of the immersion processes depend upon the electrolytic action of the base metal, i.e., the metal being plated. Deposition thus necessarily stops as soon as the base metal is entirely covered. It is thus possible to secure only very thin deposits.

According to Mantell (loc. cit) "one of the most common solutions for tinning by immersion is prepared by making a saturated solution of cream of tartar ($KHC_4H_4O_6$) in water, adding about ½ ounce of stannous chloride to each gallon (3.75 grams per liter), and raising to the boiling point. The articles to be treated are contained in a tin sieve or the solution is placed in a strong solid tin vessel and the articles agitated with a tin rod.

"Where a better class of deposit is required, immersion tinning in the above or similar baths is done by having the articles in contact with pieces of zinc. A quicker action ensues owing to electrochemical effect. Stronger and more durable deposits result.

"Brass articles to be tinned are rotated for 2 to 4 hours at 80°C. (176°F.) in a barrel containing the solution and small pieces of zinc. A widely used solution is stannous chloride crystals 3 ounces per gallon (25 grams/liter), and potassium acid tartrate ($KHC_4H_4O_6$) 1.3 ounces per gallon (10 grams/liter). When the pieces of brass and zinc come in contact in such a solution, a cell is formed in which the zinc is anode and the brass is cathode and becomes coated with tin. The zinc passes into the solution, displacing the tin. The acid tartrate causes the formation of complex ions to some extent. This produces a small concentration of stannous ions. The complex ions do not readily hydrolyze or precipitate tin hydroxides.

"The 'cream of tartar' immersion process is somewhat similar to the above, the solution consisting of potassium acid tartrate 0.2 ounce per gallon (1.5 grams/liter) and sodium chloride 0.4 ounce per gallon (3.0 grams/liter). The brass articles are placed in thin layers on iron wire trays, covered with perforated sheets of pure tin and heated to at least 90°C. (194°F.) by steam coils in a copper tank for 3 to 5 hours. The tin gradually passes into solution. It never reaches a high concentration, for it is speedily plated out on the brass, the potential of which is similar to that of copper. i.e, below that of tin in the electro-chemical series. Each bath of work requires a freshly made solution. After coating, the work is rapidly rinsed and dried.

"Alkaline solutions are also employed for tin coating of brass by immersion. A typical solution contains stannous chloride crystals 4 ounces per gallon (30 grams/liter) and sodium hydroxide 8 ounces per gallon (60 grams/liter). The brass objects are placed in an iron vessel on iron wire trays, covered with perforated sheets of tin. The vessel and its contents are heated to 90°C. (194°F.) for 2 to 3 hours. Tin becomes the anode, passes into solution, and is deposited on the brass. Solutions, more dilute than given in the formula, are used for very small articles.

"Iron articles are tinned by replacement in thin layers on iron wire screen trays, covered with perforated zinc sheets in a galvanized iron tank. The solution is heated nearly to boiling, the articles immersed and kept there for about three-quarters of an hour. The heating of the solution is stopped when the articles are immersed. A typical solution contains stannous chloride crystals 0.3 ounce per gallon (2.5 grams/liter), ammonium alum [$(NH_4)_2SO_4Al_2(SO_4)_3 \cdot 24H_2O$] 0.25 ounce per gallon (2.0 grams/liter), and cream of tartar ($KHC_4H_4O_6$) 0.01 ounce per gallon (0.08 grams/liter). Usually the salts are dissolved in one-third of the total quantity of water and then added to the other two-thirds of the water previously placed in the iron tank in which plating is to be done. About one drop of sulfuric acid per gallon of solution is then added. After the articles have been tinned, the solution is discarded and the articles quickly rinsed and dried.

"Articles for simple immersion must be thoroughly and systematically cleaned. After treatment in the tinning bath they are generally dried and polished by shaking in sawdust, leather scrap, whiting, or other polishing agents in tumbling barrels."

Tin Protochloride. See Stannous chloride.

Tin Protoxide. See Stannous oxide.

Tin Pyrites. See Stannite.

Tin Salt. See Stannous chloride.

Tin Spirits. Solutions of stannous salts used in wool dyeing.

Tin-stone. See Cassiterite.

Tin, Stream. See Cassiterite.

Tin Sulfate. See Stannous sulfate.

Tin Tartrate. See Stannous tartrate.

Tin Tetrachloride. See Stannic chloride.

Tin, Wood. See Cassiterite.

Tincal. See Borax.

Tincture. In medicine, an alcoholic solution of a drug, or an alcoholic extract from a drug material.

Tincture of Opium. See Laudanum.

Tinkal. See Borax.

"Titanellow." A proprietary brand of titanium oxalate.

Titanic Acid (Titanic hydroxide; Meta-titanic acid) H_2TiO_3.
Color and properties: White powder.
Soluble in mineral acids and alkalis; insoluble in water.
Derivation: From hydrochloric acid solution of titanates by treating with ammonia and then drying over concentrated sulfuric acid.
Grades: Technical.
Containers: Wooden kegs.
Uses: Mordant.
Railroad shipping regulations: None.*

Titanic Acid, Meta-. See Titanic acid.

Titanic Acid, Anhydride. See Titanium oxides.

Titanic Hydroxide. See Titanic acid.

Titanic Iron Ore. See Ilmenite.

Titanic Oxide. See Titanium oxides.

Titanic Sulfate $Ti(SO_4)_2.9H_2O$.
Color and properties: White crystalline needles when pure. Commercial grade, grayish-white, hygroscopic crystalline aggregates.
Soluble in water, preferably hot.
Derivation: By action of sulfuric acid on titanium oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; barrels.
Uses: Textile mordant; intermediate for preparation of other titanium compounds.
Railroad shipping regulations: None.*

Titanite (Sphene) $CaTiSiO_5$.
A natural calcium-titanium silicate. Contains variable amounts of iron and sometimes small amounts of yttrium and cerium earths.
Color and properties: Yellow, green, brown, black, gray, rose-red; white streak; adamantine or resinous luster.
Constants: Sp.gr. 3.4 to 3.56; hardness 5 to 5.5.
Occurrence: United States (New York, Pennsylvania, Arkansas, Maine, Massachusetts, New Jersey, North Carolina), Canada, Switzerland, France, Italy, Austria, England, Wales, Norway, Sweden, Russia.
Uses: Transparent crystals of good color are sometimes used as gem stones.

Titanium Ti.
Color and properties: Dark gray, amorphous powder, very hard, scratches steel.
Constants: Sp.gr. 4.50; m.p. 1,795°C.
Soluble in acids; insoluble in water.
Derivation: By heating titanous chloride with metallic sodium in a closed vessel.
Grades: Technical.
Containers: Wooden kegs.
Uses: Metallurgy; titanium salts; alloys; ferrotitanium.
Railroad shipping regulations: None.*

Titanium Dioxide. See Titanium oxides.

Titanium Ore. See Rutile.

Titanium Oxalate $Ti_2(C_2O_4)_3.10H_2O$.
Color and properties: Yellow prisms.
Soluble in water; insoluble in alcohol and ether.
Derivation: By the action of oxalic acid on titanous chloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Mordant in textile dyeing.
Railroad shipping regulations: None.*

Titanium Oxides.
(a) Titanous oxide Ti_2O_3. (b) Titanic oxide (Titanium dioxide, Titanic acid anhydride) TiO_2. (c) Titanium peroxide TiO_3.
Color and properties: (a) Black amorphous powder. (b) Commercial grade, white powder with soft texture. (c) Yellow powder.
Constants: Sp.gr. (b) 3.95; m.p. (a) oxidizes. (b) 1,560°C.
Soluble in concentrated sulfuric acid; insoluble in water.
Derivation: (a) By the oxidation of the metal, or by heating titanic acid. (b) By heating titanic acid. (c) Titanium peroxide is obtained from solutions of titanic acid with hydrogen peroxide.
Grades: Technical.
Containers: Wooden barrels.
Uses: Titanium salts. (b) Vitrified enamels for iron and steel; ceramics; pigment for paint.
Railroad shipping regulations: None.*

Titanium Peroxide. See Titanium oxides.

Titanium-potassium Oxalate $TiO(CO_2.CO_2K)_2.2H_2O$.
Color and properties: Greenish-white, lustrous crystals.
Soluble in water.
Derivation: By treating titanium hydroxide with potassium oxalate and oxalic acid.
Grades: Technical; pure.
Containers: 112 lb. kegs; 200, 230, 300 lb. barrels.
Uses: Mordant in cotton and leather dyeing.
Railroad shipping regulations: None.*

Titanium Sulfates. See Titanic sulfate and Titanous sulfate.

Titanium Tetrachloride $TiCl_4$.
Color and properties: Colorless liquid, fumes strongly in air.
Constants: Sp.gr. 1.7604; m.p. —25°C.; b.p. 136.4°C.
Soluble in dilute hydrochloric acid; decomposed by water.
Derivation: By heating titanium dioxide and carbon to redness in a current of chlorine.
Grades: Technical.
Containers: Glass bottles; steel drums.
Uses: Titanium salts; with potassium bitartrate in the textile industry as a mordant; iridescent effects in glass; artificial pearls; smoke screens.
Railroad shipping regulations: White label.

Titanous Oxide. See Titanium oxides.

Titanous Sulfate $Ti_2(SO_4)_3$.
Properties: Commercial grade made and supplied as a dark purple solution containing about 15% $Ti_2(SO_4)_3$.
Derivation: By reduction of titanic sulfate solution.
Grades: Technical.
Containers: Glass bottles; carboys; wooden barrels.
Uses: Textile industry as reducing agent for stripping or discharging colors.
Railroad shipping regulations: Requires white label marked "Acid."

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Titanox.
Color and properties: A proprietary name for a white composite pigment, stated to be approximately 25% titanic oxide and 75% barium sulfate.
Constants: Sp.gr. 4.30.
Derivation: By precipitation of hydrated titanic oxide in presence of precipitated barium sulfate, separation and heating the composite solid.
Grades: Technical.
Containers: Bags and wooden barrels.
Uses: As white pigment for paint.
Railroad shipping regulations: None.*

Tobacco Stems. Tobacco stems and stalks contain from 2 to 4% ammonia and 4 to 9% potash (K_2O). They are ground and used as a fertilizer material.
Railroad shipping regulations: None.*

Tobacco Weed. See Hamamelis.

Tobias Acid. See 2-Naphthylamine-1-sulfonic acid,

Tochlorine. See Sodium-para-toluenesulfonchloramine.

Tolamine. See Sodium-para-toluenesulfonchloramine.

Tolidine (Ortho-tolidine) $[C_6H_3(CH_3)NH_2]_2$.
Color and properties: Glistening plates.
Constants: M.p. 128°C.
Soluble in alcohol and ether; sparingly soluble in water.
Derivation: By the reduction of ortho-nitrotoluene with zinc dust and caustic soda and conversion of the hydrazo-toluene by boiling with hydrochloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: 200, 350 lb. barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Tolidine, Ortho-. See Tolidine.

Tolu Balsam (Thomas balsam; Tolu resin).
Color and properties: A brown or yellowish-brown plastic solid, brittle when old or cold, soft when fresh.
Soluble in alcohol, chloroform and ether.
Derivation: By incision into the wood of Toluifera balsamum, indigenous to Colombia.
Grades: Natural; U.S.P.; cleaned.
Containers: Natural: 50 lb. tins; 90-100 lb. cases; cleaned: 1 lb. bottles; 5, 25, 50 lb. tins.
Uses: Medicine (expectorant); perfumery (hyacinth); confectionery (glaze); fumigating compositions.

Tolu Balsam Oil. See Tolu oil.

Tolu Oil (Tolu balsam oil; Albahaca oil).
Color and properties: Yellow liquid; hyacinth-like odor.
Chief known constituents: A terpene, $C_{10}H_{16}$ and esters of cinnamic and benzoic acid.
Constants: Sp.gr. 0.945 to 1.09.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: From tolu balsam by distillation.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles.
Uses: Perfumery; medicine.
Railroad shipping regulations: None.*

Toluene (Toluol; Methylbenzene; Methylbenzol; Phenylmethane) $CH_3C_6H_5$.
Color and properties: Colorless, refractory, inflammable liquid; benzene-like odor.
Constants: Sp.gr. 0.86137; m.p. —94.5°C.; b.p. 110.7°C.
Soluble in alcohol, benzene and ether; insoluble in water.
Derivation: (a) By fractional distillation of coal-tar light oil. (b) By extraction from illuminating gas.
Method of purification: Rectification.
Grades: Pure: Distillation, 100% within 2°C. Commercial: Distillation, not over 5% at 100°C, approximately and at least 90% at 120°C. Straw color: Distillation, at least 80% at 120°C.
Containers: 5 gal. cans; 55, 110 gal. drums; 8,000 gal. tank cars.
Uses: Organic preparations; benzoic acid; dyes; perfumes; toluidines; tolidines; saccharin; explosives (T.N.T.).
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Toluenesulfamine (Toluenesulfonamide) $CH_3C_6H_4SO_2NH_2$.
Color and properties: (a) Ortho-: Octahedral crystals. (b) Para-: White leaflets.
Constants: M.p.: (a) 155°C.; (b) 137°C.
Soluble in alcohol; very slightly soluble in water.
Derivation: By amination of toluenesulfonchloride.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Saccharin; organic synthesis.
Railroad shipping regulations: None.*

Toluene Sulfochloride (Toluene sulfonechloride) $CH_3C_6H_4SO_2Cl$.
Color and properties: (a) Ortho-: oily liquid. (b) Para-: rhombic crystals.
Constants: M.p. (b) 69°C.; b.p. (b) 145° to 146°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By the action of chlorosulfonic acid on toluene.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Toluenesulfonamide. See Toluenesulfamine.

Toluenesulfonchloride. See Toluenesulfochloride.

Toluenesulfondichloramide, Para-. See Dichloramine-T.

Toluenesulfonic Acid, Ortho- and Para- $C_6H_4(SO_3H)(CH_3)$.
Soluble in alcohol and ether.
Derivation: By sulfonating toluene with concentrated sulfuric acid below 100°C.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dyes; organic synthesis.
Railroad shipping regulations: None.*

Toluene Trichloride. See Benzotrichloride.

Toluic Acid (Toluylic acid) $C_6H_4CH_3COOH$.
(a) Meta-; (b) Ortho-; (c) Para-.
Color and properties: (a) White to yellowish crystals. (b) White crystals. (c) Transparent crystals.
Constants: (a) Sp.gr. 1.0543; m.p. 108° to 109°C.; b.p. 263°C. (b) Sp.gr. 1.0621; m.p. 104°C.; b.p. 259°C. (c) M.p. 180°C.; b.p. 275°C.
(a and c) Soluble in water, alcohol and ether. (b) Soluble in water, alcohol and chloroform.
Derivation: (a) By oxidation of meta-xylene with nitric acid. (b) By oxidizing ortho-xylene with dilute nitric acid. (c) By treating cymene or turpentine with nitric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Toluic Acid, Alpha-. See Phenylacetic acid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Toluidine (Aminotoluene) $CH_3C_6H_4NH_2$.
(a) Meta-; (b) Ortho-; (c) Para-.
Color and properties: (a) Reddish-brown liquid. (b) Light yellow liquid; becomes reddish-brown on exposure to air and light; volatile with steam. (c) White, lustrous plates or leaflets.
Constants: (a) Sp.gr. 0.996; m.p. −13°C.; b.p. 203°C. (b) Sp.gr. 1.0037; m.p. −21°C.; b.p. 199.7°C. (c) Sp.gr. 0.973; m.p. 45°C.; b.p. 200.3°C.
(a) Soluble in alcohol and ether; slightly soluble in water. (b and c) Soluble in alcohol and ether; very slightly soluble in water.
Derivation: (a) By the reduction of meta-nitrobenzylidene chloride with zinc at a low temperature. (b) By the reduction of ortho-nitrotoluene or obtained mixed with para-toluidine by the reduction of crude nitrotoluene. (c) By the reduction of para-nitrotoluene with iron and hydrochloric acid.
Grades: Technical.
Containers: 450, 900 lb. iron drums.
Uses: (a) Dyes. (b) Dyes; saccharin; organic synthesis. (c) Dyes; organic synthesis.
Railroad shipping regulations: None.*

Toluidine-meta-sulfonic Acid, Ortho- $C_6H_3(CH_3)(NH_2)SO_3H$.
Color and properties: Colorless crystals.
Soluble in hot water, alcohol and ether.
Derivation: By heating acid ortho-toluidine sulfate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Toluidine-meta-sulfonic Acid, Para- $C_7H_9NO_3S$.
Color and properties: Monoclinic crystals.
Soluble in water; insoluble in ether.
Derivation: From para-toluidine sulfate by heating in oven (baking process).
Method of purification: Recrystallization as sodium salt.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Toluol. See Toluene.

Toluylene. See Stilbene.

Toluylenediamine, Meta- and Para-. See corresponding Tolylenediamine.

Toluylic Acid, Meta-, Ortho- and Para-. See corresponding toluic acid.

Tolyl-alpha-naphthylamine, Para- $C_{10}H_7NHC_6H_4(CH_3)$.
Color and properties: Colorless, short prisms.
Constants: M.p. 79°C.
Soluble in alcohol and ether.
Derivation: By heating alpha-naphthol with para-toluidine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Tolyl-beta-naphthylamine, Para- $C_{10}H_7NH.C_6H_4(CH_3)$.
Color and properties: Short, colorless, crystalline plates.
Constants: M.p. 103°C.
Sparingly soluble in alcohol.
Derivation: From beta-naphthol and para-toluidine by heating.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Tolyl Bromide. See Xylyl bromide.

Tolylenediamine, Meta- (Toluylenediamine, meta-; Diaminotoluol; Diaminotoluene) $C_6H_3(CH_3)(NH_2)_2$.
Color and properties: Rhombic prisms.
Constants: M.p. 99°C.; b.p. 280°C.
Soluble in water, alcohol and ether.
Derivation: By the reduction of meta-dinitrotoluene with iron and hydrochloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Tolylenediamine, Para- (Toluylenediamine, para-) $C_6H_3(CH_3)(NH_2)_2$.
Color and properties: Colorless, crystalline tablets.
Constants: B.p. 274°C.
Soluble in water.
Derivation: By reduction of aminoazotoluene with zinc and hydrochloric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Dye intermediate.
Railroad shipping regulations: None.*

Tolylenediamine Sulfonic Acid, Meta- $C_7H_{10}N_2O_3S$.
Color and properties: White crystalline product.
Soluble in alkalis.
Derivation: By addition of meta-toluylenediamine sulfate to oleum and heating.
Grades: Technical.
Containers: Wooden barrels.
Uses: Dyes.
Railroad shipping regulations: None.*

Tolyl-1-naphthylamine-8-sulfonic Acid, Para- (Tolyl-peri acid) $C_{17}H_{15}NO_3S$.
Color and properties: Greenish-gray needles.
Soluble in alcohol; rather insoluble in water.
Derivation: Arylation of 1-naphthylamine-8-sulfonic acid with para-toluidine.
Method of purification: Recrystallization.
Grades: Technical; mostly as sodium salt.
Containers: Barrels or steel drums.
Uses: Azo colors.
Railroad shipping regulations: None.*

Tolyl-Peri Acid. See Para-tolyl-1-naphthylamine-8-sulfonic acid.

Tomato-seed Oil.
Color and properties: Straw-yellow liquid.
Constants: Sp.gr. 0.9215; saponification value 191.6; refractive index 1.4765; acid number 0.46; iodine number 114; Hehner number 93.8.
Soluble in benzene, benzine and carbon bisulfide.
Derivation: From the dried seeds of the tomato, Lycopersicum esculentum, by pressing.
Grades: Technical.
Containers: Tins; iron drums.
Uses: Soap-making.
Railroad shipping regulations: None.*

Toncan. A ferrous alloy containing in addition to iron 0.45% copper, 0.07% molybdenum and 0.03% carbon. It is resistant to hot and cold sodium and ammonium hydroxides (except boiling), mine and sea waters, moist sulfurous atmospheres and aqueous solutions of chlorine.

Toner Black. See under Blacks.

Tonga.
A mixture of equal parts of the bark of Premna arborea and the root of Epipremnum pinnatum.
Habitat: Fiji Islands, Java, Sumatra, Paraguay and Australia.
Grades: Technical; N.F.
Containers: Bags.
Uses: Medicine (remedy for neuralgia).
Railroad shipping regulations: None.*

Tonka (Tonka bean; Coumarouna bean; Snuff bean; English bean; Dipterix).
Color and properties: Black-brownish seeds with wrinkled surface and brittle shining or fatty

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

skins; aromatic, bitterish taste; balsamic, vanilla-like odor; efflorescences of coumarin are often observed on the surface.
Derivation: Bean of Dipteryx oppositifolia and other species of the Dipteryx.
Habitat: Tropical America, Guiana and Angostura.
Grades: Technical.
Containers: 250, 500 lb. barrels.
Uses: Production of natural coumarin; medicine; flavoring extracts; toilet powders.
Railroad shipping regulations: None.*

Tonka Bean. See Tonka.

Tonex. Proprietary name for a product said to be a solid amine melting at 60° to 80°C., soluble in organic solvents and slightly soluble in boiling water. Sp.gr. about 1.11. Used to increase abrasive resistance of rubber.

Toothache Tree. See Xanthoxylum.

Topaz $(AlF)_2SiO_4$ or $[Al(FOH)]_2SiO_4$.
A natural fluosilicate of aluminum.
Color and properties: Light blue, yellow, green, pink or colorless; white streak; vitreous luster.
Varieties:
Spanish topaz
Scotch topaz
Occidental topaz } Actually yellow quartz or cirtine (q.v.).
Oriental topaz. See Corundum.
Brazil sapphires. Blue color.
Brazil rubies. Red or pink color. "Burnt topaz" obtained by heating Brazil yellow stone.

Constants:	Sp.gr.	Hardness
Topaz $(AlF)_2SiO_4$	3.55	8
Occidental topaz	2.65	7
Oriental topaz	4.0	9

Occurrence: United States (Colorado), Brazil, Russia (these two countries are the chief sources of gem topaz), Scotland, Tasmania, Japan, Mexico.
Uses: Gem stones.

Tophet A. A non-ferrous alloy containing 80% nickel and 20% chromium used primarily for resistance wire. It is resistant to mine and sea waters.

Tophet C. A ferrous alloy containing in addition to iron 60% nickel and 12% chromium. It is resistant to ammonium hydroxide and mine and sea waters. It is used principally for electrical resistance purposes.

Toponal. See Pantopon.

Torbernite (Copper uranite) $Cu(UO_2)_2P_2O_8.8H_2O$, some replacement of phosphorus by As. Emerald to grass-green mineral of pearly luster and pale green streak. Found in upper portions of lodes containing pitchblend and copper ores, also sometimes as incrustations on joint faces in granite. Variously reported as containing 56 to 61% uranium trioxide, 8.4% cupric oxide. Soluble in nitric acid.
Constants: Sp.gr. 3.4 to 3.6; hardness 2 to 2.5.
Occurrence: England, Germany, Bohemia, France, Australia.
Uses: Source of uranium and radium.

Tormentilla Root.
Root of various species of Potentilla, a small perennial plant.
Habitat: Europe, Asia.
Uses: Medicine (powerful astringent, unofficial).

Touchstone. See Lydian stone.

Tourmaline.
A complex borosilicate mineral to which no definite formula has been assigned. It is suggested that it corresponds to $H_9Al_3(BOH)_2Si_4O_{19}$, with replacement of hydrogen by alkalis and Mg, Fe and Ca. It may also contain some F. Chemically it is classified into three groups: Iron tourmaline, magnesium tourmaline, alkali tourmaline. It is often referred to using the color as a prefix. Color and properties: Jet black, white or colorless; various shades of red, blue, green, brown or a combination of two colors; white streak; vitreous or resinous luster.
Constants: Sp.gr. 2.98 to 3.20; hardness 7 to 7.5.
Occurrence: United States (New York, Maine, California, Massachusetts, New Hampshire, Connecticut, New Jersey, Pennsylvania, North Carolina), Canada, Russia, Switzerland, Germany, Brazil, Ceylon, Austria, Norway, England, Madagascar.
Uses: Being pyroelectric it finds use in polarizing apparatus; also used in gem stones; beads.

Tournesol en Drapeaux.
A blue coloring matter similar to litmus (q.v.) manufactured in France.

Tous-les-mois. See Canna.

Toxynon.
Sodium acetaminomercuric benzoate used in medicine as a germicide and a source of mercury. Unofficial.
Railroad shipping regulations: None.*

Tragacanth Gum.
Color and properties: Dull white, translucent plates or spirally twisted, yellowish powder.
Soluble in alkaline solutions, aqueous hydrogen peroxide solution; swells up with water; insoluble in alcohol.
Derivation: An exudation from Astragalus gummifer. Native to southwestern Europe, Greece, Turkey, Asia Minor, Syria, Armenia, Kurdistan, Persia.
Habitat: Levant.
Grades: Technical; U.S.P.
Containers: Kegs.
Uses: Pharmacy for making emulsions and troches; adhesives; leather dressing; calico printing; emulsifying agent.
Railroad shipping regulations: None.*

Tragacanthin. See Bassorin.

Trailing Arbutus. See Epigaea.

Train Oil. See Whale oil.

Transformer Compound. A compound used for coating or impregnating electrical apparatus subject to contact with oil. The essential ingredient is a specially treated gum. The flowing point may be around 212°F.
Railroad shipping regulations: None.*

Transformer Oils. The following are stated to be desirable characteristics of a satisfactory oil for this purpose: Little or no volatility at 100°C.; a flash point of over 160°C. (open test); freedom from water and mineral acids.
One oil, which is considerably used for this purpose, is stated to have the following characteristics:
Color and properties: Extra pale, lemon, non-viscous neutral oil.
Constants: Gr. 34°Bé.; flash point 340°F.; fire test 400°F.; cold test 20°F.; Saybolt viscosity 80.
Railroad shipping regulations: None.*

Transmission Oil. One satisfactory oil is a steam-refined cylinder stock having the following characteristics: Gr. 25°Bé.; flash point 610°F.; fire test 710°F.; cold test 30°F.; Saybolt viscosity 245.
Railroad shipping regulations: None.*

Trass.
A pale yellow, or gray-colored, metamorphosed, volcanic ash containing about 53 to 59% silica and 12 to 18% alumina. Sometimes used in the preparation of hydraulic cements.

Travertine.
A porous, cellular variety of limestone in banded layers, formed by precipitation of calcium carbonate from calcareous springs. Travertine forms the stalactites and stalagmites of caves.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Treble Superphosphate.
A name recently given to double superphosphate (q.v.).

Tremolite $CaMg_3(SiO_3)_4$.
A natural calcium-magnesium silicate. One of the amphibole minerals and a member of the group containing little or no aluminum. Color ranges from white to dark gray. See Asbestos.
Constants: Sp.gr. 2.9 to 3.1.
Occurrence: United States (Massachusetts, New York, New Jersey), Canada, Italy, Switzerland, Hungary, Sweden.

Triacetin (Glyceryl triacetate) $C_3H_5(CO_2CH_3)_3$.
Color and properties: Colorless, odorless oil.
Constants: Sp.gr. 1.160 (20°C.); b.p. 276°C.; weight per gal. 9.7 lbs.
Slightly soluble in water; very soluble in alcohol, ether and other organic solvents.
Derivation: By the action of acetic acid on glycerol.
Method of purification: Vacuum distillation followed by neutralization and filtration.
Grades: 67%.
Containers: Tinned drums and cans.
Uses: Camphor substitute in pyroxylin industries; fixative in perfumery.
Railroad shipping regulations: None.*

Tribromoacetaldehyde (Bromal) CBr_3CHO.
Color and properties: An oily colorless liquid.
Constants: Sp.gr. 3.34; b.p. 174°C.
Derivation: (a) By adding bromine to a solution of paraldehyde in ethylacetate. (b) By adding bromine to absolute alcohol, fractionating, treating the fraction boiling at 165° to 180°C. with water and distilling.
Uses: Medicine.
Railroad shipping regulations: None.*

Tribromoacetic Acid CBr_3COOH.
Color and properties: Colorless crystals.
Constants: M.p. 135°C.; b.p. 245° to 250°C.
Derivation: By oxidizing bromal with nitric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles, kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Tribromomethane. See Bromoform.

Tribromophenol. See Bromol.

Tribromophenol-bismuth. See Bismuth tribromophenate.

Tribromosalol. See Cordol.

Tribromo-tertiary-butyl Alcohol (Brometone; Acetonebromoform; Bromobutol) $CBr_3C(CH_3)_2OH$.
Color and properties: Fine white prismatic crystals, camphor odor and taste.
Soluble in water and most organic solvents.
Derivation: By action of acetone on bromoform in caustic alkali solution.
Uses: Medicine (sedative).
Railroad shipping regulations: None.*

Tributyl Alcohol, Tertiary. See Chloretone.

Tricalcic Phosphate. See Calcium phosphate, tribasic.

Tricalcium Ortho-arsenate. See Calcium arsenate.

Tricalcium Ortho-phosphate. See Calcium phosphate, tribasic.

Tricalcium Phosphate. See Calcium phosphate, tribasic.

Tricarbimide. See Cyanuric acid.

Trichloracetic Aldehyde. See Chloral.

Trichloracetic Acid. See Trichloroacetic acid.

Trichloroacetic Acid (Trichloracetic acid) CCl_3COOH.
Color and properties: Deliquescent, colorless crystals; pungent, suffocating odor; strongly caustic.
Constants: Sp.gr. 1.6298; m.p. 57.3°C.; b.p. 195°C.
Soluble in water, alcohol and ether.
Derivation: (1) Treating chloral hydrate with fuming nitric acid; (2) from glacial acetic acid by the action of chlorine in presence of sunlight, ultra-violet radiation or catalysts.
Method of purification: Crystallization.
Grades: Technical; C.P.; U.S.P.
Containers: Tightly stoppered glass bottles.
Uses: Organic synthesis; reagent for detection of albumin; medicine (caustic, astringent, antiseptic); pharmacy (corn and wart removers).
Railroad shipping regulations: None(?)*

Trichloroacetic Aldehyde. See Chloral.

Trichloroacetic Aldehyde, Hydrated. See Chloral hydrate.

Trichlorobutyl Alcohol, Tertiary. See Chloretone.

Trichlorobutylidene Glycol. See Butylchloral hydrate.

Trichloroethane. See Ethylene chlorochloride.

Trichloroethylene C_2HCl_3.
Color and properties: Colorless liquid with a mild characteristic odor.
Constants: Sp.gr. 1.472 (15°C.); freezing point −70°C.; b.p. 88°C.; specific heat 0.233 calories at (18°C.); heat of vaporization 58 calories per kilogram.
Miscible with all common organic solvents.
Derivations: (a) From tetrachloroethane by treatment with lime or alkali in the presence of water followed by steam distillation. (b) From ethylene by chlorination followed by fractional distillation.
Method of purification: Distillation.
Grade: High purity.
Containers: 1, 5, 10 gal. cans; 1 pint, 1 quart cans; 55, 100 gal. iron drums.
Uses: Fat extraction; perfumes; textiles; foods; paints and varnish; leather, glues and gelatins; soap; dry cleaning; rubber; extraction of miscellaneous organic substances and manufacture of various organic chemicals.
Railroad shipping regulations: None.*

Trichloroisopropyl Alcohol. See Isopral.

Trichloromethane. See Chloroform.

Trichloromethylchloroformate (Diphosgene; Superpalite) $ClCOOCCl_3$. A military poison gas used in the late war.

Trichloronitromethane. See Nitrotrichloromethane.

Tricyanic Acid. See Cyanuric acid.

Tridymite. SiO_2.
A vitreous, colorless or white, native form of pure silica. Found variously but not so commonly as quartz (q.v.). Quartz will change into tridymite with a 16.2% increase in volume at 870°C. Unlike quartz, it is soluble in boiling sodium carbonate solution.
Constants: Sp.gr. 2.28 to 2.3; hardness 7.

Triethanolamine $(CH_2OHCH_2)_3N$.
Color and properties: Viscous, pale yellow liquid intermediate in properties between alcohol and ammonia; slightly ammoniacal odor; excellent penetrating properties; forms soaps with fatty acids; hygroscopic. Commercial product contains 70 to 75% triethanolamine, 20 to 25% diethanolamine, 0 to 5% monoethanolamine.
Soluble in water.
Constants: B.p. 277° to 279°C. (150 mm.). Weight per gallon 9.3 lbs. at 15.6° C.
Grades: Technical.
Containers: 5, 10, 55, 110 gal. drums. Net contents 45, 90, 450, 900 lbs.
Uses: Fatty acid soaps used as emulsifying agents for mineral and vegetable oils, paraffin, carnauba

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

wax, kerosene; softener for paper and textiles; solvent for organic substances such as casein, dyes; penetrating agent in impregnating wood, and paper, dyeing of textiles; dispersing agent in rubber, synthesis of resins, ink; cosmetics; adhesives; drycleaning; stuffing leather.
Railroad shipping regulations: None.*

Trifolium (Red clover blossoms).
Dried inflorescence of Trifolium pratense.
Habitat: Europe; cultivated in the United States.
Grades: N.F.
Uses: Medicine, with doubtful value.

Trigemin (Dimethylaminoantipyrinebutylchloral hydrate) $C_{17}H_{24}N_3O_3Cl_3$.
Color and properties. Long white needles, mild taste, delicate aromatic odor.
Constants: Fusing point 85°C.
Derivation: By the action of butyl chloral hydrate on pyramidone.
Uses: Medicine (analgesic, unofficial).
Railroad shipping regulations: None.*

Trihydrated Telluric Oxide. See Telluric acid.

Trihydroxyanthraquinone. See Anthrapurpurin.

3:4:5-Trihydroxybenzoic Acid. See Gallic acid.

Trihydroxymethylanthraquinone. See Emodin.

Triïodomethane. See Iodoform.

Trillium (Beth root).
Dried rhizome and root of Trillium erectum.
Habitat: United States.
Grades: N.F.
Uses: Medicine (ingredient of compound, elixir of Viburnum).

Trimethol (Trimethylmethoxyphenol) $C_6H(CH_3)_3OCH_3OH$.
A very powerful disinfectant, phenol coefficient 40, used in medicine as an internal antiseptic, unofficial.
Railroad shipping regulations: None.*

Trimethylamine $(CH_3)_3N$.
Color and properties: Colorless, liquefied gas; fishy, ammoniacal odor.
Constants: Sp.gr. 0.662; b.p. 3.2° to 3.8°C.
Soluble in water, alcohol and ether.
Derivation: By the interaction of methyl iodide and ammonia.
Method of purification: Crystallization.
Grades: Technical; 10% solution; 33% solution.
Containers: Steel cylinders.
Uses: Organic synthesis.
Railroad shipping regulations: Green gas label.

1:2:4-Trimethyl-5-aminobenzene. See Cumidine.

Trimethylbenzene. See Cumene.

Trimethylbenzol. See Cumene.

Trimethylene Bromide $CH_2BrCH_2CH_2Br$.
Color and properties: Colorless liquid; sweet odor.
Constants: Sp.gr. 1.923 (17.6°C.); b.p. 166°C.
Insoluble in water, soluble in organic solvents.
Derivation: Synthetic.
Method of purification: Distillation after washing with concentrated sulfuric acid.
Grades: Technical; C.P.
Containers: Carboys, drums.
Uses: Intermediate.
Railroad shipping regulations: None.*

Trimethylethylene. See Amylene.

Trimethylmethoxyphenol. See Trimethol.

Trimethylxanthine. See Caffeine.

Trinitrin. See Nitroglycerin.

Trinitrocellulose. A nitrocellulose (q.v.)

Trinitroglycerin. See Nitroglycerin.

Trinitrophenol. See Picric acid.

Trinitrotoluene (TNT; Trinitrotoluol; Methyltrinitrobenzene) $C_6H_2CH_3(NO_3)_3$.
Color and properties: (a) Yellow, monoclinic needles.

Constants:	(a) Alpha- 2:4:6	(b) Beta- 2:3:4	(c) Gamma- 2:4:5
Specific gravity	1.654	1.62	1.62
Melting-point	80.9°C.	112°C.	104°C.

Soluble in alcohol and ether; insoluble in water.
Derivation: By the nitration of toluene with mixed acid.
Method of purification: Washing.
Grades: Technical.
Containers: Wooden cases or kegs.
Uses: Explosive.
Fire hazard: Dangerous.*
Railroad shipping regulations: Explosives regulation.

Trinitrotoluol. See Trinitrotoluene.

Trional. See Sulfoneëthylmethane.

Trioxyanthraquinone. See Anthragallol.

Trioxybenzene. See Pyrogallic acid.

Trioxybenzoic Acid. See Gallic acid.

Trioxybenzol. See Pyrogallic acid.

Trioxymethylene (Meta-formaldehyde) $C_3H_6O_3$.
Color and properties: White, crystalline powder or needles.
Constants: M.p. 60° to 61°C.; b.p.: Sublimes.
Soluble in water, alcohol and ether.
Derivation: By the polymerization of formaldehyde.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Disinfectant.
Railroad shipping regulations: None.*

Tripalmitin (Palmitin) $C_3H_5(OC_{16}H_{31}O)_3$.
Color and properties: White, crystalline powder.
Constants: M.p. 65.5°C.
Soluble in ether and chloroform.
Derivation: From fats.
Grades: Technical.
Containers: Tins.
Uses: Medicine; soap; leather dressing.
Railroad shipping regulations: None.*

Tripe Stone. See Anhydrite.

Triphan. See Strontium-alpha-phenylcinchoninate.

Triphenylguanidine $C_6H_5N(C_6H_5NH)_2$.
Color and properties: White crystalline powder.
Constants: Sp.gr. 1.10; m.p. 144°C.
Derivation: Desulfurization of thiocarbanilide in presence of aniline.
Purification: Crystallization.
Grades: Technical.
Containers: 100 lb. galvanized iron drums.
Uses: Accelerator for vulcanization of rubber.
Railroad shipping regulations: None.*

Triphenyl Phosphate $(C_6H_5)_3PO_4$.
Color and properties: Slightly deliquescent, colorless, odorless, crystalline needles.
Constants: M.p. 53°C.; b.p. 245°C.
Soluble in alcohol, acetone, ether, benzene, concentrated sulfuric acid and chloroform; insoluble in water.
Derivation: Phenol and phosphorus oxychloride are boiled in presence of a little zinc chloride, until no more hydrogen chloride is given off. The product is shaken with caustic soda solution, filtered and the residue dissolved in ether. The ethereal solution is dehydrated and the ether evaporated.
Method of purification: Crystallization.
Grades: Technical.
Containers: 450 lb. barrels.
Uses: Camphor substitute in celluloid, stabilizing and fire-proofing acetyl cellulose, cellulose form-

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

ate, nitrocellulose and airplane dope; impregnating roofing paper.
Railroad shipping regulations: None.*

Triphyllite. A mineral containing lithium-ferro-manganese phosphate.

Tripoli (Rotten stone).
Derivation: A porous, siliceous rock resulting from the natural decomposition of siliceous sandstone.
Containers: 150, 200, 220 lb. bags; 500 lb. barrels.
Uses: Abrasive; polishing powder; filtering material; absorbent for insecticidal chemicals; paints (inert filler, wood filler); rubber filler; base for scouring soaps and powders.

Tripolite. See Diatomaceous earth.

Trisodium Phosphate. See Sodium phosphate, tribasic.

Tristate Special No. 1.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases — Class B.
Characteristic ingredient: — Class Ia.
Railroad shipping regulations: High explosive.
See Explosives, permissible.

Tristearin (Stearin) $C_3H_5(C_{18}H_{35}O_2)_3$.
Color and properties: White powder, odorless, tasteless.
Constants: M.p. 71.6°C.
Derivation: Constituent of most fats.
Grades: Technical.
Containers: Barrels.
Uses: Soap; candles.
Railroad shipping regulations: None.*

Triticum (Couch grass; Dog grass; Quick grass; Graminis; Agropyrum).
Color and properties: Straw-colored to brownish-yellow masses; sweet taste; slight odor.
Chief constituents: Triticin; levulose; inosite; acid malates.
Derivation: The dried rhizome of Agropyron repens; habitat: United States, Europe and northern Asia.
Grades: Technical; N.F.
Containers: Bags; boxes.
Uses: Medicine (for its influence on the genito-urinary organs).
Railroad shipping regulations: None.*

Tritochorite. See Cuprodescloizite.

Tritopine $C_{42}H_{54}N_2O_7$.
Color and properties: White, crystalline alkaloid; poisonous!
Constants: M.p. 182°C.
Soluble in alcohol; slightly soluble in ether.
Derivation: From opium.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Trochees. Lozenges—small, dry, solid masses, usually flattened, consisting for the most part of powders incorporated with sugar and mucilage.

Trojan Coal Powders. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
M-2	A	3
M-3	A	3
M-5	A	3
M-6	A	3
P-1	B	3
P-2	B	3
P-3	B	3

Railroad shipping regulations: High explosive.

Trona (Urao) $NaCO_3.NaHCO_3.2H_2O$.
A natural sodium sesquicarbonate and the most important of the natural sodas.
Color and properties: White, gray or yellow with vitreous, glistening luster; contains 41.2% Na_2O, 38.9% CO_2, 19.9% H_2O with some impurities.
Occurrence: Extensive deposits in Hungary, Egypt, Africa, Venezuela and United States.

Troostite.
A mixture of Fe_3C in beta-iron or of crystallized Fe_3C and crystallized alpha-iron. Obtained by reheating martensitic steel to 400°C. or on cooling relatively slowly through critical range. Sometimes found in center of large objects quenched in water or oil.

Troostite (Mineral). See Willemite.

Tropacocaine Hydrochloride $C_{15}H_{19}NO_2.HCl$.
Color and properties: Crystalline alkaloid salt; poisonous!
Constants: M.p. 271°C.
Soluble in water, alcohol and ether.
Derivation: From a variety of Erythroxylon coca.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Local anesthetic.
Railroad shipping regulations: None.*

Tropine $C_8H_{15}NO$.
Color and properties: White, crystalline alkaloid; very hygroscopic; poisonous!
Constants: M.p. 61.2° to 63°C.
Soluble in water, alcohol and ether.
Derivation: By heating atropine or hyoscyamine with barium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Tropine-platinum Hydrochloride $(C_8H_{15}NOHCl)_2.PtCl_4$.
Color and properties: Orange-red monoclinic tablets; poisonous!
Constants: M.p. 198° to 200°C.
Soluble in water; insoluble in alcohol.
Derivation: By the action of chloroplatinic acid on tropine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Trotter Oil.
Neatsfoot oil (q.v.).

True Lavender. See Lavender.

Trumpet Weed. See Eupatorium purpureum.

Tryparsamine (Sodium phenylglycinamine-para-arsonate) $(NH_2COCH_2NHC_6H_4AsOOHONa)_2.H_2O$.
Color and properties: Colorless crystalline powder, odorless. Contains 24.6% arsenic. May produce amblyopia.
Soluble in water; almost insoluble in alcohol, ether, chloroform, benzene.
Grades: Medicinal.
Uses: Medicine (trypanosomiasis, unofficial).
Railroad shipping regulations: None.*

Trypsin. The proteolytic enzyme of the pancreatic juice. It acts on the albuminoid material producing amino acids. The maximum result is obtained in a neutral or slightly alkaline medium. Trypsins or similar materials are found not only in the pancreas but also in the spleen, leucocytes and urine and also in beer yeast, molds and bacteria.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Tubania Alloys.
Jeweler's alloys, usually composed of antimony, brass or copper, tin and bismuth, but of considerable variation in composition. The alloy used in England is composed of 12 parts each of antimony, bismuth, brass and tin. The alloy used in Germany is composed of 42 parts antimony, 4 parts copper, and 3¼ parts tin.

Tufa. See Travertine. Found in California, Utah and Washington.

Tumenol.
Color and properties. Dark-brown or brownish-black syrupy liquid.
Derivation: Bituminous shale oils are subjected first to the action of sodium hydroxide and then to sulfuric acid to remove first phenols and then pyridine and other bases. The dark syrupy liquid which then separates on treatment with fuming sulfuric acid, is dissolved in sodium hydroxide and recovered by extraction with ether.
Uses: Medicine (eczema, other skin affections, particularly prurigo parasitic dermatitis, unofficial).
Railroad shipping regulations: None.*

Tuna Oil (Tunny-fish oil).
Color and properties: Pale yellow to red-brown liquid; characteristic odor.
Constants: Iodine value 156.
Soluble in alcohol, ether, chloroform, benzine and carbon bisulfide.
Derivation: By expressing the livers of Thynnus vulgaris.
Method of purification: Filtration.
Grades: Crude; refined.
Containers: Wooden barrels.
Uses: Paints.
Railroad shipping regulations: None.*

Tung Oil (Chinese-wood oil; China-wood oil).
Color and properties: Yellow, drying oil. Jellies or solidifies when kept. Reputed to be poisonous.
Constants: Sp.gr. 0.9360 to 0.9432; saponification value 193; iodine value 150 to 165; refractive index 1.5030.
Derivation: From the seeds of Aleurites cordata, a tree indigenous to China and Japan, by roasting, grinding and pressing. The tree is now being grown on a commercial scale in Florida.
Impurities: Tung oil, being expensive, is frequently adulterated with cottonseed oil, soyabean oil, etc.
Grades: White; black; cold-pressed, yellow; hot-pressed, dark. Japanese tung oil is an inferior grade with notably poorer drying qualities.
Containers: 75 lb. cases; 350, 375 lb. barrels; 8,000 gal. tank cars.
Uses: Varnishes; linoleum; making varnish dryers.
Railroad shipping regulations: None.*

Tungates. Compounds of tung oil (Chinese-wood oil) with various metallic oxides, used as paint and varnish dryers.

Tungsten W (Wolfram).
Color and properties: Hard, brittle, gray metal; very heavy. Not found native. See Ferberite, Hubnerite; Scheelite; Wolframite. Found in Arizona, California, Colorado, Nebraska, Nevada, New Mexico and Texas.
Constants: Sp.gr. 18.77; m.p. 3,267°C.
Soluble in nitric acid and concentrated hot potassium hydroxide solution; insoluble in water.
Derivation: By the aluminothermic reduction of tungstic oxide.
Grades: Technical.
Containers: Wooden kegs.
Uses: High-speed tool steel; non-ferrous alloys, electric-lamp industry; contact points in automotive and telegraph industries (wireless apparatus); dentistry; phonograph needles; shell steel; chemical apparatus. As ferrotungsten it is used for making alloy steel and magnetic steel.
Railroad shipping regulations: None.*

Tungsten Carbide. An alloy of which the base metal is tungsten and the hard component is tungsten carbide. It may contain from 85 to 95% tungsten carbide and from 5 to 15% cobalt. The alloy is known as cemented tungsten carbide.
Method of manufacture: It is produced by first manufacturing a very fine powder of tungsten carbide. The fine powder is then mixed with metallic cobalt. The mixture is then ball-milled, the action causing the cobalt to be smeared over the surface of the minute microscopic particles of the carbide. The mixture, after ball-milling, is then pressed into any desired shape and size. It may be partially sintered then by heating to a low temperature in which condition it can be handled without breaking, and can be easily shaped with a steel tool. It is not really machinable in the sense that the metal can be cut by an ordinary tool, but partially sintered powder can be removed with ease.

The final sintering is done in an electric furnace with a hydrogen atmosphere at a brilliant white heat. This is the true cementing operation and cobalt is the cementing material. It is known that the cobalt takes up a little of the tungsten carbide in the process, but essentially the finished product consists of minute particles of tungsten carbide cemented together with cobalt or with cobalt containing some tungsten and carbon.

Properties: In density cemented tungsten carbide ranges, say, between fourteen and fifteen, sometimes lower, sometimes a little higher, so that it is relatively dense. Its hardness is difficult to appraise. It has a very high resistance to abrasion. Its resistance to indentation is relatively less than one might expect from its resistance to abrasion. The tungsten carbide itself has a hardness about comparable to sapphire or corundum. The scratch hardness of the cemented tungsten carbide is equal to the hardness of the hardest constituent, hence is equal to the hardness of the tungsten carbide. The indentation is made easier by the presence of the cobalt and hence the indentation hardness is relatively low as compared with the scratch hardness and as compared with the wear resistance of the material.

Whereas high speed steel requires a special heat-treatment to develop its hardness, cemented tungsten carbide is fully hard after cooling to room temperature from the high temperature sintering operation. It cannot be softened by heat-treatment alone. It can be reheated to a very high temperature and cooled either rapidly or slowly and it is still hard. Its red hardness surpasses that of any other metallic substance used in the tool industry. It appears that temperatures which are ordinarily reached even in relatively severe industrial operations are not high enough to materially affect the red hardness of cemented tungsten carbide.

Grades: Available in various grades according to the composition and methods of manufacture.
Uses: Machine tools (inserted as a tip on a shank of cheaper material by copper brazing in an atmosphere of hydrogen or by welding and ground on specially designed grinding wheels of which the base material is silicon carbide); drawing dies; blanking dies. Some of the materials which can be shaped by machining with cemented tungsten carbide tools are glass, porcelain, compounds used in electrical industries such as "micalex", fibrous materials which are abrasive, asbestos compositions, bakelite molded products, etc. It can also be used for cutting and sawing rock. It is used in gages, knife edges, blast nozzles, etc. It is more suitable in work on rough cuts (over 0.015 at high speed)

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

than for fine finishing cuts (0.003) on steel. The extreme hardness of cemented tungsten carbide tool by prolonging the life of the tool decreases both the replacements and the time lost in replacements and there is less machine scrap. It seems reasonable that the material offers the possibility of increasing, on the average, production in machine shops to the extent of 20%, or will make possible the production in five days that which now takes six. Some of the trade names under which it is sold are Carboloy, Diamondite, Straus metal, Widia.

Tungsten Steel. See Iron and Steel (Ferrum).

Tungstic Acid (Wolframic acid; Ortho-tungstic acid) $W_2O_5(OH)_2$.
Color and properties: Yellow powder.
Insoluble in water; soluble in hydrofluoric acid and alkalis.
Derivation: Decomposition of sodium tungstate with sulfuric acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Barrels; kegs.
Uses: Textiles (mordant, color resist); plastics; tungsten metal, wire, etc.
Railroad shipping regulations: None.*

Tungstic Acid, Ortho-. See Tungstic acid.

Tunicin. See Cellulose, animal.

Tunnelite C.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class A.
Characteristic ingredient: Class Ia.
Railroad shipping regulations: High explosive.
See Explosives, permissible.

Tunny-fish Oil. See Tuna oil.

Tuno Gum. See Chicle gum.

Turbine Oil.
The desirable characteristics of an oil for use with heavy horizontal turbines are bright yellow color, high flash test, low viscosity, the ability to maintain its body and efficiency under warm temperatures and low moisture-absorptive capacity.
One good steam-turbine oil is said to have the following characteristics: Gravity 30°Bé.; flash point, 420°F.; Saybolt viscosity, 150 (at 70°F.).
Railroad shipping regulations: None.*

Turbith Mineral. See Mercuric sulfate.

Turgite (Hydrohematite) $Fe_4O_5(OH)_2$.
Dark reddish-black, or bright red mineral usually found with limonite or hematite. It is frequently mistaken for limonite and commercially is classed with it. Contains 66.2% iron.
Constants: Sp.gr. 4.29 to 4.68; hardness 5.5 to 6.
Occurrence: United States (Connecticut), Prussia, Siberia.
Uses: Source of iron.

Turkey Corn. See Corydalis.

Turkey Galls. See Galls.

Turkey Red Oil (Sulfonated castor oil).
Derivation: By sulfonating castor oil with sulfuric acid and washing.
Grades: Based on moisture content.
Containers: 100 lb. kegs; 400, 500, 750 lb. barrels.
Uses: Textiles; leather.
Railroad shipping regulations: None.*

Turkish Geranium Oil. See Geranium oil, Turkish.

Turkish Green.
A bluish-green pigment obtained by heating a mixture of 3 parts cobalt carbonate, 2 parts chromium oxide, and 4 parts freshly precipitated alumina. The shade can be varied by increasing or decreasing the cobalt or chromium content. It will retain its color in artificial light.

Turmeric. See Curcuma.

Turmeric Oil. See Curcuma oil.

Turmeric Root. See Hydrastis.

Turnbull's Blue. See Iron blues.

Turnera. See Damiana.

Turnerite. See Monazite.

Turner's Yellow (Cassel yellow; Montpellier yellow; Verona yellow).
Yellow pigments consisting of basic lead chloride ($PbCl_2.7PbO$). They have now given way to chrome yellows (q.v.).

Turpentine (Terebenthina). A mixture of a resin and volatile oil obtained from coniferous trees. Yellowish, opaque masses, sticky and more or less glossy, with characteristic odor and taste.
Soluble in alcohol, ether, chloroform, and glacial acetic acid.
Chief constituents: A volatile oil (turpentine oil) and a resin.
Derivation: By incision into the wood of coniferous trees in the spring of the year.
Containers: Tins, bottles, barrels.
Uses: Source of turpentine oil.

Turpentine Camphor. See Terpene hydrochloride.

Turpentine, Chian.
Color and properties: Yellow to green, thick, tenacious liquid. Similar odor to that of turpentine but more pleasant. Thickens to a translucent, yellowish mass on exposure to air.
Derivation: From Pistacia terebinthus, found in the islands of Chios and Cypress.
Uses: Medicine (local application for uterine cancers).
Railroad shipping regulations: None.*

Turpentine, Mineral. See Turpentine substitutes.

Turpentine Oil (Spirits of turpentine; Turps).
An oil obtained by distilling turpentine with either water or steam which has not been superheated. The crude turpentine consists of an exceedingly sticky, viscid, liquid balsam which exudes from incisions cut in coniferous trees. The principal countries producing this oil are America, France, Russia, Spain, Austria, Greece and (recently) Mexico.
Chief known constituents: Pinene; dipentene.
Varieties:

American turpentine oil.
Species from which crude is derived: Pinus palustris, Mill.; Pinus heterophylla, Sudw.; Pinus echinata, Mill.
Color and properties: Colorless, mobile liquid, rosin-like odor.
Constants: Considerable variation appears in constants reported. The following were given in United States Department of Agriculture Bulletin No. 144, 1911, p. 22. Sp.gr. 0.8617 to 0.8889 at 20°C.; optical rotation −34° 8′ to +29° 6′; refractive index 1.4684 to 1.4818; b.p., 154 to 159°C.; iodine value, 350 to 400 (Wijs); acid value, 0.140 to 0.286; saponification value, 2.44 to 8.60; colorimeter value (Lovibond) 0.7 to 2.5 for yellow and 0.0 to 0.5 for red.

French turpentine oil.
Species from which crude is derived: Pinus pinaster, Sol.
Constants: Sp.gr., 0.865 to 0.875 at 15°C.; optical rotation, −29° to −23°.

Austrian turpentine oil.
Species from which crude is derived: Pinus laricio, Poir.
Constants: Sp.gr. 0.863 to 0.870; optical rotation −36° 30′ to −39° 10′; refractive index 1.46905 to 1.47033.

Spanish turpentine oil.
Species from which crude is derived: Pinus pinaster, Sol.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Constants: Similar to those of French turpentine.

Greek turpentine oil.

Species from which crude is derived: Pinus halepensis, Mill.

Constants: Sp.gr. 0.8605 to 0.8660 at 15°C.; optical rotation +34° to +41°; refractive index, 1.465 to 1.474.

Russian turpentine oil.

Species from which crude is derived: Pinus silvestris, L.

Constants: Not available since no distinction is made in commerce between Russian pine-tar oil and Russian turpentine oil.

Containers: Bottles; tins; barrels.

Uses: Medicine; solvent; paints; varnishes; lacquers.

Railroad shipping regulations: None.*

Turpentine Oil, Wood.

An oil obtained in America by steam distillation of the stumps of pine trees which have been killed by boxing.

Constants: Sp.gr. 0.859 to 0.915 at 20°C.; optical rotation +16° 5′ to 36° 14′; refractive index, 1.4673 to 1.4755; b.p. 153° to 177°C.; iodine value 300 to 362 (Wijs); acid value 0.080 to 0.312; saponification value 1.06 to 8.75; colorimetric value (Lovibond) for yellow 0.5 to 10.0; for red 0.2 to 1.4.

Chief known constituents: Terpineol, pinene, camphene, limonene, dipentene, cineole, terpinene.

Containers: Bottles; tins; barrels.

Uses: Same as turpentine oil.

Railroad shipping regulations: None.*

Turpentine Substitutes. A class of products used either for admixture with turpentine or to wholly replace it. They are usually petroleum fractions, intermediate between gasoline and illuminating oil, and vary in gravity from 40° to 58°Bé. The best grades evaporate without leaving a stain or residue.

Constants of one market sample:

Gravity at 60°F....................48.2°Bé.
Refractive index at 60°F...............1.4595
One drop evaporated from white paper..No stain
Evaporation in a watch glass:
15 drops of substitute........2 hrs. 23 min.
15 drops of turpentine........2 hrs. 15 min.
Initial boiling-point..................282°F.
Final boiling-point....................426°F.

Railroad shipping regulations: None.

Turpentine, Venice.

Color and properties: Yellowish, limpid, tenacious liquid; pleasant aromatic odor; hot, pungent, bitter taste; becomes hard and brittle on exposure to air.

Chief known constituents: Pinene.

Constants: Sp.gr. 0.865 to 0.878 at 15°C.; optical rotation −8° 15′ to −11°; refractive index 1.46924; acid value 0; ester value 5.9.

Solubility in alcohol: In 6 vols. and more of 90% alcohol.

Derivation: Distilled from Larix europaea, D. C. (Pinus Larix, L.).

Habitat: Middle and southern Europe.

Uses: Varnish.

Railroad shipping regulations: None.

Turpeth. Dried root and stem of Ipomoea turpethum.

Habitat: India, Malay, China, Ceylon, Australia.

Uses: Medicine (purgative).

Turpeth Mineral. See Mercuric subsulfate.

"Turps." See Turpentine oil.

Turquois.

A natural hydrous phosphate of aluminum and copper containing some iron. Various formulas have been written but it probably corresponds to $[Al(OH)_2,Fe(OH)_2,Cu(OH),H]_3PO_4$. The copper and iron content ranges from 2.0 to 8.5% CuO and 0.1 to 4.0% Fe_2O_3.

Color and properties: Blue, blue grading to apple-green, greenish-gray; white or greenish streak; dull or wax-like luster.

Constants: Sp.gr. 2.42 to 2.89; hardness 5 to 6.

Odontolite or bone turquois is fossil bone or teeth of prehistoric animals which have taken up iron phosphate.

Occurrence: United States (New Mexico, Nevada, Virginia), Persia, Sinai, Turkestan.

Uses: Gem stone (natural turquois of poor color is often tinted artificially; many stones only retain their fine blue color while moist; when dry they change to green and become of little value commercially).

Turtle Oil.

Color and properties: A yellow semi-solid oil with an odor of beef-drippings.

Derivation: In South America from turtle eggs; in Seychelle Islands and Jamaica from turtle fat.

Use: Similar to cod-liver oil.

Tuscan Red. A red iron oxide pigment.

Tussol (Antipyrine mandelate; Phenyl glycolate) $C_{11}H_{12}N_2OC_6H_5CHOHCOOH$.

Color and properties: White powder.

Constants: Fusing point 52° to 53°C.

Soluble in water.

Uses: Medicine (whooping cough).

Tutocaine (Aminobenzoyldimethylaminomethylbutanol hydrochloride, para-; Dimethyl-amino-alpha-beta-dimethylpropyl-para-aminobenzoate hydrochloride, gamma-; Aminobenzoyldimethylamino-1:2-dimethylpropanol hydrochloride, para-). $(CH_3)_2NCH_2CHCH_3CHCH_3OCOC_6H_4NH_2HCl$.

Color and properties: Light, ivory-colored crystalline powder, virtually odorless, feeble bitter taste. More toxic than procaine.

Constants: M.p.: 212° to 215°C.

Soluble in water, with difficulty in alcohol.

Uses: Medicine (local anesthetic, surface anesthesia, subcutaneous injection, unofficial).

Railroad shipping regulations: None.*

Twitchell Reagent $C_6H_4HSO_3C_{17}H_{35}COO$.

Sulfobenzene stearic acid, a reagent used in the Twitchell process for splitting fats and oils.

Type Metal.

An alloy of variable composition consisting essentially of antimony, lead and tin but sometimes also containing from 1 to 1.5% of copper for the purpose of improving wear.

Typical analysis:

Type size	Tin	Lead	Antimony
		Per Cent	
Large	7.5	78	14.5
Medium	9.0	73	18
Small	14.5	57	28.5

Tyrite. See Fergusonite.

Tyrolean Earth. See Earths, green.

Tyuyamite. See Carnotite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

U

Uintahite. See Gilsonite.

Uintaite. See Gilsonite.

Ulexine. See Cytisine.

Ulexite (Boronatrocalcite; Cotton ball) $NaCaB_5O_9 . 8H_2O$.
A natural hydrated sodium-calcium borate. Sometimes known as "cotton ball" from its white, rounded masses of loosely compacted, intertwined, silky fibers. Contains 43.0% B_2O_3, 13.8% CaO, 7.7% Na_2O, balance water.
Constants: Sp.gr. 1.65; hardness 1.
Found in dry lakes or in the marshes of shallow nearly dry lakes in California, Nevada and Oregon. The important deposit is in Chile. See Sodium borate.

Ulmin Brown. See Van Dyke brown.

Ulmus (Elm; Slippery elm).
Flat pieces, externally light brown with dark brown patches; mucilaginous taste.
Derivation: Dried bark of Ulmus fulva, deprived of its periderm.
Habitat: Eastern and central North America.
Grades: Technical; U.S.P.
Containers: Burlap bags; boxes.
Uses: Medicine (demulcent).
Railroad shipping regulations: None.*

Ultramarine, Blue. Composition variable,—probably a double silicate of sodium and aluminum, with some sodium sulfide, the latter appearing to influence the color.
Color and properties: Dark-blue powder or lumps. Color-fast to light, soap and alkalis, but sensitive to even weak acids.
Derivation:
(a) Found in nature as the mineral lapis lazuli (q.v.). (b) Artificial product: (1) Direct method, by heating in muffles or crucibles a charge of soda ash, kaolin, charcoal, and sulfur; sometimes with the addition of powdered quartz, sand, or kieselguhr in order to make the product less sensitive to acids. (2) Indirect method, by first producing green ultramarine by heating in crucibles a mixture of kaolin, anhydrous sodium sulfate, and charcoal or rosin. The green ultramarine is then powdered and "colored" by heating in contact with powdered sulfur. The product is ground, washed, and then boiled with sodium sulfide solution.
Containers: Kegs.
Uses: Paint pigment; paper manufacture (neutralizing yellow color); calico printing; laundry blue; printing inks; coloring mottled soaps, rubber, linoleum, plastics, etc. Note: The artificial product has now entirely superseded the ground mineral for these uses.
Railroad shipping regulations: None.*

Ultramarine, Green.
A green pigment formed as an intermediate product in the production of artificial ultramarine blue (q.v.).

Ultramarine, Red.
A red pigment prepared by heating blue ultramarine to not over 145°C., in the presence of nitric acid vapors.
Railroad shipping regulations: None.*

Ultramarine, Violet. A violet pigment prepared by heating a silica-rich blue ultramarine to 175°C., in an atmosphere of chlorine and steam. It has poor tinctorial properties.
Railroad shipping regulations: None.*

Ultramarine Yellow. See Barium chromate; also Chrome yellows.

Umber.
Color and properties: Brown powder containing ferric oxide together with silica, alumina, manganese and lime. See also Limonite. (a) Raw umber which is ground and then levigated. (b) Burnt umber which is calcined at low heat.
Grades: Based on tinctorial power and iron content; the best come from Cyprus.
Containers: Wooden barrels.
Uses: Paint pigment; lithographic inks; wall paper (pigment).
Railroad shipping regulations: None.*

Unguentum. Ointment, a fatty base in which a drug or mixture of drugs is incorporated.

Unicorn Root. See Aletris.

Unions. United States permissible explosives classified by the United States Bureau of Mines as follows. (See Explosives, permissible for definition of classes.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
A, L.F.	B	I a
B, L.F.	B	I a
D, L.F.	A	I a
F, L.F.	B	I a
G, L.F.	A	I a
H, L.F.	B	I a

Railroad shipping regulations: High explosive.

Uragoga. See Ipecac.

Uralorthite. See Allanite.

Uranine (Uranine yellow; Fluorescein-sodium) $Na_2C_{20}H_{10}O_5$.
Color and properties: Yellowish-brown powder. Soluble in water and alcohol.
Derivation: By treatment of fluorescein with sodium carbonate solution and crystallizing.
Method of purification: Recrystallization.
Grades: Technical.
Containers. Glass bottles.
Uses: Dyeing silk and wool yellow; following the course of subterranean waters; detection of death.
Railroad shipping regulations: None.*

Uranine Yellow. See Uranine.

Uraninite.
A complex uranium mineral containing also rare earths, radium, lead, helium, nitrogen, argon, etc. In color is some shade of black with olive-green, dark brown, or gray streak. Pitch-like or submetallic luster. Soluble in nitric acid. Occurs in two forms:
Crystallized. Uranniobite (q.v.), bröggerite (q.v.), cleveite (q.v.), nivenite (q.v.).
Massive. Pitchblend (q.v.), nivenite (q.v.).
The primary mineral is usually pitchblend and the important deposits are generally in veins, e.g.,—tin, silver-nickel-cobalt, or silver-gold

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

veins. The crystallized form occurs as a constituent of coarse granites.
Constants: Sp.gr. 6.5 to 9.7; hardness 5.5
Occurrence: United States (Colorado, Connecticut, North Carolina, Utah), Bohemia, Germany, England, Norway.
Uses: Source of uranium and radium salts.

Uranium U.
Color and properties: A heavy metallic element. Not found native. All uranium minerals contain radium. See Autunite, Carnotite, Fergusonite, Mackintoshite, Nivenite, Pitch blend, Polycrase, Samarskite, Thorianite, Thorogummite, Torbernite, Uraninite, Uranocircite, Uranophane, Uranospinite and Yttrialite.
Constants: Sp.gr. 18.685; m.p. 800°C.
Soluble in acids; insoluble in water, alcohol or alkalis.
Derivation: By the reduction of the oxide with carbon in the electric furnace.
Grades: Technical.
Containers: Boxes; glass bottles.
Uses: Uranium compounds; ferro-uranium.
Railroad shipping regulations: None.*

Uranium Acetate (Uranyl acetate) $UO_2(C_2H_3O_2)_2.2H_2O$.
Color and properties: Small, yellow crystals; decomposed by light; poisonous!
Constants: M.p.: Loses $2H_2O$ at 275°C.
Soluble in cold water and alcohol; decomposes in hot water.
Derivation: By the action of acetic acid on uranium oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Amber glass bottles.
Uses: Medicine; analytical chemistry.
Railroad shipping regulations: None.*
See also Uranium-sodium acetate.

Uranium Chlorides (Uranyl chlorides) (a) Uranium trichloride UCl_3; (b) Uranium tetrachloride UCl_4; (c) Uranium pentachloride UCl_5.
Color and properties: (a) Brownish-red crystals; (b) dark green crystals; (c) dark green, crystalline needles; poisonous!
Soluble in cold water and ammonium chloride solution.
Derivation: By the action of hydrochloric acid on uranium oxides.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Uranium salts.
Railroad shipping regulations: None.*

Uranium Nitrate (Uranyl nitrate) $UO_2(NO_3)_2.6H_2O$.
Color and properties: Yellow, rhombic crystals.
Constants: Sp.gr. 2.807; m.p. 60.2°C.; b.p. 118°C.
Soluble in water, alcohol and ether.
Derivation: By the action of nitric acid on uranium oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers. Glass bottles; boxes.
Uses: Uranium oxide; photography; uranium glaze; medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Uranium Oxides (a) Uranium dioxide UO_2; (b) Uranic oxide U_3O_8; (c) Uranium trioxide UO_3; (d) Uranium peroxide $UO_4.2H_2O$.
Color and properties: (a) Black crystals; (b) olive-green powder; (c) yellow powder; (d) yellow crystals.
Constants: Sp.gr.: (a) 10.95; (b) 7.31; (c) 5.02 to 5.26. M.p.: (a) 2,176°C.
Soluble in acids and insoluble in water.
Derivation: By oxidation of the metal.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Ceramics; pigments.
Railroad shipping regulations: None.*

Uranium Oxide, Yellow. See Sodium uranate.

Uranium-sodium Acetate $UO_2(C_2H_3O_2)_2.NaC_2H_3O_2$.
Color and properties: Yellow crystals.
Soluble in water and alcohol.
Derivation: By mixing sodium acetate and uranium acetate solutions and crystallizing.
Method of purification: Recrystallization.
Impurities: Sodium acetate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Uranium compounds.
Railroad shipping regulations: None.*

Uranium Sulfate
(a) Uranous sulfate $U(SO_4)_2.4H_2O$;
(b) Uranyl sulfate $UO_2SO_4.3H_2O$.
Color and properties: (a) Green crystals. (b) Yellow crystals.

Constants:	(a)	(b)
Specific gravity	....	3.280
Melting-point	Loses $4H_2O$ at 300°C.	....
Boiling-point	Oxidizes.	....

(a) Soluble in dilute acids; decomposes in water. (b) Soluble in water and concentrated hydrochloric acid.
Derivation: By the action of sulfuric acid on (1) uranium dioxide (b) uranic anhydride, UO_3.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical analysis.
Railroad shipping regulations: None.*

Uranium Trioxide. See Uranium oxides.

Uranium Yellow. See Sodium uranate.

Uranniobite. A crystallized variety of uraninite (q.v.) containing thoria but with the earths of the lanthanum and yttrium groups only sparingly represented. Sp.gr. 9.0 to 9.7.

Uranocircite. Natural, hydrous phosphate of uranium and barium $BaO.2UO_3.P_2O_5.8H_2O$. Found in South Dakota.

Uranophane. Natural hydrous silicate of uranium and calcium $CaO.2UO_3.2SiO_2.6H_2O$. Found in North Carolina.

Uranospinite. Probably an arsenate of uranium and calcium corresponding to autunite, $CaO.2UO_3.As_2O_5.8H_2O$. Found in Utah.

Uranous Oxide. See Uranium oxides.

Uranyl Acetate. See Uranium acetates.

Uranyl Chlorides. See Uranium chlorides.

Uranyl Nitrate. See Uranium nitrate.

Urao. See Trona.

Urasol. See Acetylmethylenedisalicylic acid.

Urea (Carbamide) $CO(NH_2)_2$.
Color and properties: White crystals.
Constants: Sp.gr. 1.323; m.p. 132°C.
Soluble in water, alcohol and benzene; slightly soluble in ether.
Derivation: (a) By heating ammonium cyanate. (b) By treating calcium cyanamide with dilute acids.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: 1, 5 lb. bottles; 110, 220 lb. cases.
Uses: Medicine; stabilizing explosives; stabilizing celluloids; organic synthesis; fertilizer.
Railroad shipping regulations: None.*

Urea (Carbamide) German Synthetic $CO(NH_2)_2$.
Color and properties: White, granular.
Soluble in water.
Derivation: By high-pressure treatment of ammonia gas and carbon dioxide.
Grade: For fertilizer, containing 46% ammonia.
Containers: Shipped in paper-lined asphaltum-treated sacks.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Uses: Primarily as fertilizer.
Railroad shipping regulations: None.*

Urea Quinate. See Urol.

Urea-calcium Nitrate. See Calurea.

Urea-quinine. See Quinine and urea hydrochloride.

Urease. Enzyme present in the soy bean and in the jack bean and possibly in other legumes. Also present in blood and urine, and secreted by certain microörganisms. Its principal use is in the determination of urea in urine and in blood. It splits urea into ammonia and CO_2.

Ureous Acid. See Xanthine.

Urethan. See Ethyl carbamate.

Uric Acid (Lithic acid; Uric oxide) $CO(NH)_2COC_2CO(NH)_2$.
Color and properties: White crystals.
Constants: Sp.gr. 1.855 to 1.893; m.p.: Decomposes; b.p.: Decomposes.
Soluble in hot concentrated sulfuric acid; very slightly soluble in water; insoluble in alcohol and ether.
Derivation: From urine or bird excrement.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Uric Oxide. See Uric acid.

Urine Salt, Fusible. See Sodium-ammonium phosphate.

Urner's Liquid Chloroacetic Acid. See Dichloroacetic acid.

Urocitral (Theobromine sodium citrate).
Color and properties: White, alkaline powder containing 45% theobromine.
Moderately soluble in water.
Uses: Medicine (diuretic, unofficial).
Railroad shipping regulations: None.*

Urol (Urea quinate) $C_7H_{12}O_6.2CO(NH_2)_2$.
Color and properties: Prismatic crystals.
Constants: M.p. 106° to 107°C.
Soluble in hot water.
Uses: Medicine (diuretic, unofficial).
Railroad shipping regulations: None.*

Uropherin B (Theobromine-lithium benzoate) $LiC_7H_7O_2N_4+LiC_7H_5O_2$.
Color and properties: White powder containing 47% theobromine. Decomposed by atmospheric carbon dioxide.
Soluble in water.
Uses: Medicine (diuretic, unofficial).
Railroad shipping regulations: None.*

Uropherin S (Theobromine-lithium salicylate) $LiC_7H_7O_2N_4+LiC_7H_5O_3$.
Similar properties and uses to Uropherin B (q.v.).
Railroad shipping regulations: None.*

Uropurgol. See Hexamethylenetetramine methylene citrate.

Urotropin. See Hexamethylenetetramine.

Urotropin Quinate. See Hexamethylenetetramine quinate.

Uva Ursi (Bearberry).
Dried leaves of Arctostaphylos uva ursi.
Habitat: Northern Europe; North America, south to New Jersey, Colorado and California, and Asia.
Grades: Technical; U.S.P.
Containers: Boxes; bales.
Uses: Medicine (treatment of catarrh of the urinary tract).
Railroad shipping regulations: None.*

Uvanite $2UO_3.3V_2O_5.15H_2O$.
Brownish-yellow mineral resembling carnotite (q.v.) in appearance and occurrence, but lacking the clear yellow color. Soluble in ammonium carbonate.
Occurrence: United States (Utah).

Uvarovite. See Garnet.

Uvic Acid. See Racemic acid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

V

VGB. A trade name for acetaldehyde-ethylenediamine used as a rubber antioxidant and age resister. It is a light brown powdered resin with sp.gr. 1.15 and m.p. 60° to 80°C. Used in air-cured goods, frictions, proofed goods, auto tires, insulated wire, jar rings, mechanical goods.

Vaccinium (Whortleberry; Bilberry; European huckleberry).
Derivation: Dried berries and leaves of Vaccinium myrtilius.
Habitat: Europe.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Valentinite (Ortho-rhombic antimony trioxide) Sb_2O_3.
White or gray mineral, sometimes pale red. White streak and adamantine or silky luster. An alteration product of stibnite and other antimony minerals. Contains 83.3% antimony. See Senarmontite.
Constants: Sp.gr. 5.57 to 5.76; hardness 2 to 3.
Occurrence: Algiers, Servia, Italy, Germany.

Valeraldehyde. See Isovaleric aldehyde.

Valerian.
Dried rhizome and roots of Valeriana officinalis.
Habitat: Europe, northern Asia and eastern United States.
Grades: Technical; U.S.P.
Containers: Bags.
Uses: Medicine (sedative to the higher nerve centers); valerian oil.
Railroad shipping regulations: None.*

Valerian Oil.
Color and properties: Yellowish or brownish liquid; characteristic, penetrating odor.
Chief known constituents: Pinene, camphene, borneol and esters of borneol.
Constants: Sp.gr. 0.940 to 0.950.
Soluble in alcohol, ether, chloroform, acetone, benzene and carbon bisulfide.
Derivation: Distilled from roots and rhizome of Valeriana officinalis.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Medicine; tobacco perfume.
Railroad shipping regulations: None.*

Valerian Oil, Japanese (Kesso oil).
Color and properties: Green, thick liquid, essential oil. Cannot be distinguished from the ordinary valerian oil.
Chief known constituents: Pinene, camphene, dipentene, terpineol, borneol, esters.
Constants: Sp.gr. 0.996.
Soluble in alcohol, ether, chloroform, benzene, acetone and carbon bisulfide.
Derivation: Distilled from the rhizome and roots of Valeriana officinalis, var. augustifolia.
Method of purification: Rectification.
Grades: Technical.
Containers: Iron drums; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Valeriana Celtica Oil.
Color and properties: Yellow liquid; strong, aromatic odor.
Constants: Sp.gr. 0.967; b.p. 250° to 300°C.
Soluble in alcohol, ether, chloroform, acetone, benzene and carbon bisulfide.
Derivation: Distilled from the root of Valeriana celtica.
Method of purification: Rectification.
Grades: Technical.
Containers: Copper flasks; glass bottles.
Uses: Soaps; perfume.
Railroad shipping regulations: None.*

Valerianic Acid (Pentoic acid, primary; Valeric acid, anhydrous; Valeric acid, hydrated; Isobutylcarbonyl) $CH_3(CH_2)_3COOH$.
Color and properties: Transparent, colorless, oily liquid; exceedingly disagreeable, rancid odor; bitter burning taste.
Constants: Sp.gr. 0.95592; m.p. 38°C.; b.p. 176.7°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: (a) By oxidizing amyl alcohol with bichromate and sulfuric acid. (b) From root of Valeriana officinalis by distillation.
Grades: Technical.
Containers: 100 lb. carboys; 8 lb. glass bottles.
Uses: Medicine; artificial fruit essences; perfumery.
Railroad shipping regulations: None.*

Valerianic Ether. See Ethyl valeriate.

Valeric Acid, Anhydrous. See Valerianic acid.

Valeric Acid, Hydrated. See Valerianic acid.

Valeric Acid, Iso-. See Valerianic acid.

Valeric Acid, Normal (Propylacetic acid) $CH_3(CH_2)_3CO_2H$.
Color and properties: Clear, colorless liquid; butyric acid odor.
Constants: Sp.gr. 0.9415; m.p. —58.5°C.; b.p. 186.4°C.
Soluble in alcohol and ether; slightly soluble in water.
Derivation: Obtained synthetically from propylmalonic acid or butylcyanide.
Grades: Technical.
Containers: Carboys; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Valeric Aldehyde. See Isovaleric aldehyde.

Valerydin. See Isovaleryl-para-phenetidine.

Validol (Menthol valeriate).
Color and properties: Colorless liquid; mild pleasant odor; cooling, faintly bitter taste.
Soluble in menthol.
Derivation: By the action of valeric acid on menthol.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Validol Camphorated.
Color and properties: Colorless, thick liquid; cool faintly bitter taste.
Derivation: A mixture of validol with 10% of camphor.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Valisan. See Brovalol.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Valley Brown Ore.
A local name for limonite or brown iron ore. Applied in Virginia to the comparatively pure high-grade ore found in the Cambro-Ordovician limestone which forms the Valley of Virginia. See Mountain brown ore.

Valonia.
Derivation: The acorn cups of an oak Quercus aegilops, native of Greece, Asia Minor and France. The cups are very large and are covered with coarse hair or "beard" which is very rich in tannin. Good valonia contains 30% tannin.
Grades: 65% tannin; solid.
Containers: Cups: 100-200 lb. (average about 150 lb.) burlap bags. Extract: Wooden barrels.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Valve Oil. See Cylinder stocks.

Valyl (Diethyl valeramide) $C_4H_9CON(C_2H_5)_2$.
Color and properties: Colorless liquid, burning taste, characteristic odor. Produces convulsions of cerebral origin.
Constants: B.p. 210°C.
Uses: Medicine (substitute for valerian in hysterical and allied neuroses, unofficial).
Railroad shipping regulations: None.*

Vanadic Acid
(a) Meta- HVO_3
(b) Ortho- H_3VO_4
(c) Pyro- $H_4V_2O_7$

These acids have never been prepared and apparently do not exist in the pure state. Various investigators have claimed to be able to produce meta-vanadic acid and pyro-vanadic acid, but recent studies have proven that they only obtained various acid vanadates. The three acids above named, however, are represented in the various alkali and other metal vanadates. Ordinarily, when vanadic acid is mentioned, vanadium pentoxide (vanadic acid anhydride) is meant.

Vanadic Anhydride. See Vanadium pentoxide.

Vanadic Sulfate. See Vanadyl sulfate.

Vanadinite (Vanadium ore)
$3Pb_3(VO_4)_2.PbCl_2$ or $(PbCl)Pb_4(VO_4)_3$.
Deep red, bright-red, yellow or brown mineral with white to pale yellow streak. Resinous luster on fracture. Found in the oxidized zone of lead-bearing veins. When pure contains 19.4% V_2O_5, 78.7% PbO. There is often some replacement by phosphorus or arsenic and it then grades into mimetite or pyromorphite or endlichite (q.v.). Soluble in strong nitric acid.
Constants: Sp.gr. 6.66 to 7.23; hardness 3.
Occurrence: United States (New Mexico, Arizona), Scotland, Russia.
Uses: Ore of vanadium.

Vanadium V.
Color and properties: Light gray, crystalline metal. It does not occur native but is found in the United States in the minerals carnotite, roscoelite, vanadinite, descloizite, volborthite, calciovolborthite, aegirite, etc. Found in Arizona, Colorado, Montana, New Mexico, Utah. The principal source of the vanadium products of commerce is patronite, an impure vanadium sulfide mined in Peru.
Constants: Sp.gr. 6.025. M.p. about 1,730°C.
Soluble in mineral acids; insoluble in water.
Derivation: Pure vanadium has never been prepared; very nearly pure vanadium containing some carbon, iron, etc., has been prepared in the electric furnace and by reduction with aluminum, cerium, etc. Vanadium is found in commerce in the form of ferro-vanadium, cupro-vanadium, etc. The constants given for vanadium have been obtained by extrapolation.
Uses: Manufacture of steel.

Vanadium Chloride (Hypovanadic hydrochloride; Divanadyl tetrachloride) $(VO)_2Cl_4.5H_2O$.
Color and properties: Dark green syrupy mass; poisonous!
Constants: Sp.gr. 3.23.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on vanadium oxides.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden barrels.
Uses: Mordanting textiles; medicine; rendering hydrochloric acid arsenic-free.
Railroad shipping regulations: None.*

Vanadium Dichloride VCl_2.
Color and properties: Apple green hexagonal plates.
Constants: Sp.gr. 3.23 at 18°C.
Soluble in alcohol and ether.
Derivation: From VCl_3 by heating in atmosphere of nitrogen.
Method of purification: Sublimation in nitrogen.
Grades: C.P.
Containers: Sealed glass containers.
Uses: As strong reducing agent; purification of HCl from arsenic.
Railroad shipping regulations: None(?)*

Vanadium Ore. See Vanadinite.

Vanadium Oxides. See Vanadium pentoxide, Vanadium tetraoxide and Vanadium trioxide.

Vanadium Pentasulfide. See Vanadium sulfide.

Vanadium Pentoxide V_2O_5.
Color and properties: Yellow to red; rhombic.
Constants: Sp.gr. 3.357 at 18°C.; m.p. 658°C.; b.p.: Decomposes at 1,750°C.
Soluble in acids and alkalis.
Derivation: (1) Alkali or acid extraction from vanadium minerals. (2) By igniting ammonium meta-vanadate.
Method of purification: Alkali solution, precipitation as ammonium meta-vanadate and ignition to V_2O_5.
Grades: Commercial air dried; commercial fused; C.P. air dried; C.P. fused.
Containers: Compressed paper drums.
Uses: Starting material for other vanadium salts; catalysis of SO_2 to SO_3; catalysis of sucrose to oxalic acid, ethyl alcohol to acetaldehyde, benzene to maleic acid; ceramic coloring material; inoculation of plant life; inhibiting ultra-violet transmission in glass.
Railroad shipping regulations: None(?)*

Vanadium Sesquioxide. See Vanadium oxides.

Vanadium Steel. See Iron and steel (Ferrum).

Vanadium Sulfide (Vanadium pentasulfide) V_2S_5.
Color and properties: Green powder.
Constants: Sp.gr. 3.0; m.p.: Oxidizes.
Soluble in acids; alkaline sulfides and alkalis; insoluble in water.
Derivation: By the action of hydrogen sulfide on vanadium chloride solution.
Grades: Technical.
Containers: Wooden kegs.
Uses: Vanadium compounds.
Railroad shipping regulations: None.*

Vanadium Tetrachloride VCl_4.
Color and properties: Red liquid.
Constants: Sp.gr. 1.8584 at 0°C.; m.p. —109°C.; b.p. 154°C.
Soluble in absolute alcohol and ether; decomposes in water; decomposes slowly to VCl_3 and Cl at temperatures below 630°C.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: Chlorination of ferrovanadium.

Method of purification: Distillation and fractionation.

Grades: Technical; C.P.

Containers: Sealed glass bottles.

Uses: Medicinal for skin diseases; starting material for preparation of VCl_3 and VCl_2.

Railroad shipping regulations: None(?)*

Vanadium Tetraoxide V_2O_4.

Color and properties: Blue-black.

Constants: Sp.gr. 4.539; m.p. 1,967°C.

Derivation: (1) From V_2O_5 by oxalic acid reduction. (2) From V_2O_5 by carbon reduction.

Grades: Technical; C.P.

Containers: Glass bottles.

Uses: Catalyst at high temperature.

Railroad shipping regulations: None(?)*

Vanadium Trichloride VCl_3.

Color and properties: Purple.

Constants: Sp.gr. 3.0 at 18°C.

Soluble in absolute alcohol and ether.

Derivation: From VCl_4 by boiling under reflux condenser.

Grades: C.P.

Containers: Glass bottles.

Uses: Starting material for preparation of VCl_2.

Railroad shipping regulations: None(?)*

Vanadium Trioxide V_2O_3.

Color and properties: Black.

Constants: Sp.gr. 4.87 at 18°C.; m.p. 1,970°C.

Soluble in alkalis and HF.

Derivation: From V_2O_5 by hydrogen reduction; from V_2O_5 by carbon reduction.

Grades: Technical; C.P.

Containers: Glass bottles.

Uses: Catalysts of ethylene to ethyl alcohol.

Railroad shipping regulations: None(?)*

Vanadyl Salts. See under Vanadium.

Vanadyl Sulfate $2VOSO_4.5H_2O$.

Color and properties: Blue.

Soluble in water.

Derivation: Reduction of cold solution of concentrated H_2SO_4 and V_2O_5 by SO_2 gas.

Method of purification: (1) Recrystallization. (2) Wash with alcohol.

Grades: Technical; C.P.

Containers: Glass bottles; kegs.

Uses: Mordant; catalyst; aniline black preparation; reducing agent.

Railroad shipping regulations: None(?)*

Van Dyke Brown (Rubens brown; Cassel brown; Cassel earth; Cologne brown; Cologne earth; Ulmin brown).

Derivation: Indefinite mixtures of iron oxide and organic matter. Obtained from bog-earth, peat deposits or from ochers containing bituminous matter.

Grades: Based on iron oxide content and tinctorial value.

Containers: Wooden kegs.

Uses: Pigment.

Railroad shipping regulations: None.*

Van Dyke Red.

A brownish-red pigment consisting of copper ferrocyanide, sometimes used in artist's paints.

Vanilla Bean.

Cured, full grown, but immatured fruit of Vanilla planifolia.

Habitat: Mexico; West Indies; Reunion; Society Island.

Chief constituents: Coniferin and two ferments which latter change coniferin to vanillin during the process of curing.

Grades: Technical; N.F.

Containers: Bags; boxes.

Uses: Confectionery; flavoring (source of vanillin); perfumery; pharmaceuticals.

Railroad shipping regulations: None.*

Vanilla Plant. See Liatris.

Vanillic Aldehyde. See Vanillin.

Vanillin (Methylprotocatechuic aldehyde; Vanillic aldehyde) $CHOOCH_3OH$.

Color and properties: White crystalline powder; pleasant aroma; vanilla taste.

Constants: M.p. 81° to 82°C.; b.p. 285°C.

Soluble in water, alcohol, ether, chloroform and glycerol.

Derivation: By the oxidation of isoeugenol or coniferyl alcohol, or by extraction of the vanilla bean.

Method of purification: Crystallization.

Grades: Technical; U.S.P.

Containers: 1, 16 oz. bottles; 1, 16, 80, 160, 400 oz. tins.

Uses: Perfumes; flavoring; pharmaceuticals.

Railroad shipping regulations: None.*

Vargol.

Color and properties: Greenish-black lustrous scales consisting of 20% silver combined with albumin. Very hygroscopic.

Soluble in water.

Grades: N.N.R.

Uses: Similar to argyrol (q.v.).

Railroad shipping regulations: None.*

Varley's Cement. See under Cements, electric.

Varnish.

A resinous solution, or a drying oil, which, when exposed to the air, becomes hard and impervious to air and moisture, either through evaporation of the solvent or oxidation of the oil. It is used to place a hard, glossy transparent coating on a surface.

Technically, varnishes may be divided into three classes: (a) Those which harden by evaporation of the solvent, such as spirit varnishes. These consist of resin dissolved in alcohol, petroleum spirit, acetone, or in any other volatile solvent; (b) Turpentine varnishes, in which the resin is dissolved in oil of turpentine; (c) Linseed oil varnishes, which may consist of linseed oil alone, or with the addition of resin and turpentine oil. Tung oil is also used.

Commercially, varnishes are referred to according to the resin used or the use to which they may be put. Thus, shellac varnish, copal varnish, kauri varnish, dammar varnish, lac varnish, bookbinder's varnish, cabinet varnish, etc.

The standard unit is 100 lbs. of resin and varnishes are described as containing a specific number of gallons of oil to this unit, weighed before melting. Thus a "20 gal. Kauri," or "20 K," consists of 20 gals. linseed oil, 30 gals. spirit of turpentine (perhaps) and 100 lbs. of Kauri resin. A "20 Brown 3 half benzine" would be 20 gals. linseed oil, 15 gals. spirit of turpentine and 15 gals. benzine and 100 lbs. No. 3 Brown Kauri resin.

A "long" varnish contains more oil than a "short" varnish and thus is more elastic. In a general way, a long varnish will contain 20 gals. of oil or more while a short varnish will contain 12 gals. or less; spar and wearing-body varnishes being typical of the former, while rubbing and furniture varnishes are typical of the latter.

Railroad shipping regulations: Red label.

Some typical specific varnishes follow:

Varnish, carriage-finishing. Also called wearing-body because it is used for the finishing or wearing-coat of carriage bodies. May contain up to about 30 to 35 gallons of oil. See also Gear varnish.

Varnish, coach. Really a cheap rosin varnish which is *not* used in coach-painting.

Varnish, cold. Made by heating linseed oil to 105°C. during a period of four and one half

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** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

hours, adding manganese driers and agitating the mass with compressed air.

Varnish, floor. Usually contains about 15 to 18 gallons of oil. Present-day floor varnishes usually contain some tung oil.

Varnish, gear. A varnish for the understructure and wheels of vehicles. May contain about 22 to 27 gallons of oil.

Varnish, lithographic. Linseed oil converted into varnish by heating above 250°C.

Varnish, marine. Usually a cheaper grade of spar varnish (q.v. under Varnish) and generally contains some tung oil.

Varnish, rubbing. Used as foundation coats for further coats of varnish. They generally contain 6 to 12 gallons of oil and become hard enough to be rubbed down in from one to six days.

Varnish, spar. So-called because originally designed for varnishing ships' masts and spars. Usually consists of about 20 to 30 gallons of oil and all hard resins, the best for the purpose being a 50-50 mixture of Zanzibar and Kauri.

Varnish-makers' Naphtha.
Turpentine substitute of 52°Bé. and deodorized naphtha (58 to 60°Bé.) are both stated to be satisfactory for this purpose.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Varnish Oil. An oil obtained by the distillation of a gum resin and used in the manufacture of varnishes.

Varnish Remover. See Paint remover.

Vaseline. See Petrolatum.

Vaseline, Artificial. See Vaseline, German.

Vaseline, German (Artificial vaseline). Solid paraffin of low melting-point mixed with heavy lubricating oil.

Vassy Cement. See under Cements, structural.

Vegetable Blacks. See under Blacks.

Vegetable Calomel. See Podophyllum.

Vegetable Gelatin. See Agar-agar.

Vegetable Glue. See Glue, vegetable.

Vegetable Gum. See Dextrin.

Vegetable Ivory. The hardened albumin of the seeds of the ivory-nut (corozo nut) tree (Phytelephas macrocarpa). The latter must be distinguished from the cohune-palm (Attalea cohune) whose seed are also sometimes referred to as corozo nuts.

Vegetable Mercury. See Manaca.

Vegetable Parchment.
A product made by immersing unsized paper in 75 to 84% sulfuric acid for a short period of time followed by immediate washing and drying. The process results in a layer of semi-transparent gelatinous amyloid or cellulose hydrate being deposited on the surface. The paper becomes tough and resembles natural parchment in appearance. Thick sheets can be made by pressing together layers of paper which have been processed.
A product of a like character can be obtained by beating sulfite pulp into a slimy mass and forming into sheets. This comes on the market in tissues under the name of Pergamyn. See also Cellulith.
Uses: Semi-permeable membranes, packing greasy materials, substitute for natural parchment.
Railroad shipping regulations: None.*

Vegetable Pepsin. See Papain.

Vegetable Spermaceti. See Chinese wax.

Vegetable Sulfur. See Lycopodium.

Vegetable Wax of Japan. See Japan wax.

"Velvetex." See under Blacks.

Velvril. A proposed gutta-percha substitute composed of a mixture of collodion cotton and nitrated castor or linseed oils.

Venasquite. See Micas, brittle.

Venetian Red. A high-grade pigment of a purer red hue than either light red (q.v.) or Indian red (q.v.). It is obtained either native, as a variety of red hematite (q.v.), or artificially, more usual, by calcining copperas in the presence of lime. The composition ranges from 20 to 40% ferric oxide and from 60 to 80% calcium sulfate.

Venice Turpentine. See Turpentine, Venice.

Ventura Flux. See Sulfurized asphalts.

Veratrine (Veratria) $C_{37}H_{53}NO_{11}$.
Color and properties: A mixture of colorless, crystalline alkaloids; very poisonous!
Constants: M.p. 180°C.
Soluble in alcohol, chloroform and ether; very slightly soluble in water.
Derivation: By extraction from the seeds of Asagraea officinalis (sabadilla).
Method of purification: Crystallization.
Impurities: Cevadine.
Grades: Technical; N.F.
Containers: ⅛, 1, 5 oz. vials and bottles.
Uses: Medicine (counter irritant in neuralgia and arthritis).
Railroad shipping regulations: None.*

Veratrine Sulfate $(C_{32}H_{49}NO_9)_2.H_2SO_4$.
Color and properties: White to yellowish powder; poisonous!
Soluble in water and alcohol.
Derivation: By the action of sulfuric acid on veratrine.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Veratroylaconine. See Aconite.

Veratrum (American hellebore; Green hellebore; Indian poke).
Dried rhizome and roots of Veratrum viride; alkaloids; poisonous!
Habitat: North America.
Grades: Technical; U.S.P.
Containers: Boxes; burlap bags.
Uses: Medicine (for its action on the heart).
Railroad shipping regulations: None.*

Verbasci (Mullein).
Dried flowers and leaves of a species of Verbascum.
Habitat: Europe, United States.
Grades: N.F.
Uses: Medicine (demulcent).

Verbena Oil, East Indian. See Lemon-grass oil.

Verbena Oil, Singapore. See Citronella oil, Singapore.

Verde Antique. A dark-green rock composed essentially of serpentine (hydrous magnesium silicate). Usually criss-crossed with white veinlets of magnesium and calcium. Used as an ornamental stone. In commerce often classed as a marble. California, Georgia, Maryland, Massachusetts, New York and Virginia.

Verde Salt. See Thenardite.

Verdigris, Blue. See Copper acetate, basic.

Verdigris, Crystallized. See Copper acetate.

Verdigris Green. See Copper acetate, basic.

Vermilion. See Mercuric sulfide, red.

Vermilion, Chinese. See Mercuric sulfide, red.

Vermilion, Natural. See Cinnabar.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Vermilion, Permanent.
This is usually orange mineral (q.v.) tinted with para-nitraniline. It has great tinctorial strength.

Vermilion, Quicksilver. See Mercuric sulfide, red.

Vermilionettes. Brilliant red pigments produced by coloring neutral white mineral bases with coal-tar dyes. They have good covering power and work well in oil but fade on exposure to the light.

Verona Green. See Earths, green.

Verona Yellow. See Turner's yellow.

Veronal (Diethylmalonylurea; Barbital; Barbitone; Malonurea; Diethylbarbituric acid) $(C_2H_5)_2C(CONH)_2CO$.
Color and properties: White crystals or powder; bitter taste.
Constants: M.p. 187 to 190°C.
Soluble in hot water, alcohol, ether, acetone, ethyl acetate.
Derivation: By the interaction of the diethylester of malonic acid and carbamide.
Grades: Technical; U.S.P.
Containers: Glass bottles; boxes.
Uses: Medicine (to induce sleep and as a sedative).
Railroad shipping regulations: None.*

Veronal, Soluble (Barbital; Barbital, soluble sodium).
Color and properties: White powder, stable, odorless, bitter taste. When dried to constant weight at 100°C. contains not less than 98.5% of $CO(NaNCO)(HNCO)C(C_2H_5)_2$ containing 89.3% barbital.
Soluble in water; slightly soluble in alcohol; insoluble in ether.
Uses: Medicine (same as veronal).
Railroad shipping regulations: None.*

Veronese Earth. See Earths, Green.

Veronica (Speedwell).
Derivation: The herb, Veronica officinalis.
Habitat: Europe, Asia and United States.
Grades: Technical.
Containers: Bags.
Uses: Medicine.
Railroad shipping regulations: None.*

Verte Antique (Copper green). A paint pigment, essentially bicarbonate of copper, used for producing a corroded copper effect. Note: Not to be confused with the mineral known as Verde antique (q.v.).

Vertivert. See Vetiver oil.

Vesipyrin. See Phenylacetylsalicylate.

Vesuvianite (Idocrase).
A complex basic calcium-aluminum silicate of uncertain formula. Probably $Ca_6[Al(OH, F)]Al_2(SiO_4)_6$ or $R'_4Ca_7Al_2Si_6O_{24}$ where $R'_4 = Ca_2$, $(AlOH)_2$, $(AlO_2H)_4$, or H_4.
Color, brown, green; vitreous to resinous luster.
Constants: Sp.gr. 3.35 to 3.45; hardness 6.5.
Occurrence: United States (Maine, New Hampshire, New York, New Jersey, Montana), Canada, Italy, Switzerland, Austria, Hungary, Russia, Siberia, Norway, Mexico.
Uses: Gem stone.
See also Californite.

Vesuvine. A trade name for Bismarck brown.

Vetiver Oil (Cuscus oil; Vertivert).
Color and properties: Thick, liquid, yellow essential oil; violet-like odor.
Constants: Sp.gr. 1.01 to 1.02.
Soluble in alcohol, ether, chloroform, acetone, benzene and carbon bisulfide.
Derivation: Distilled from the root of Andropogon muricatus.
Method of purification: Rectification.
Grades: Technical (Bourbon, French, East Indian, Java).
Containers: 1, 5, 10 lb. bottles.
Uses: Perfumery.
Railroad shipping regulations: None.*

Viburnum Opulus (Cramp bark; High cranberry; Cranberry tree; Water elder; Squaw bush; Snowball bush).
Dried bark of Viburnum opulus.
Habitat: Europe, Asia and northern North America south to Pennsylvania.
Chief constituents: Valeric acid, an enzyme and viburnin.
Grades: Technical; N.F.
Containers: Burlap bags.
Uses: Medicine (doubtful value).
Railroad shipping regulations: None.*

Viburnum Prunifolium (Black haw; Sweet viburnum; Sheep-berry; Stag bush; Sloe).
Dried bark of root of Viburnum prunifolium.
Habitat: United States.
Grades: Technical; N.F.
Containers: Burlap bags.
Uses: Medicine (doubtful value).
Railroad shipping regulations: None.*

Victoria Green. Trade name for malachite green.

Victoria Red. See Chrome red.

Victory Silver. See German silver.

Vienna Caustic. See Caustic, Vienna.

Vienna Green. See Copper acetoarsenite.

Vienna Paste. See Caustic, Vienna.

Vietinghofite. See Samarskite.

Vigorite No. 5, L.F.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class C.
Characteristic ingredient: Class 4.
Railroad shipping regulations: High explosive.
See Explosives, permissible.

Vinasse. The residue obtained from beet sugar molasses fermentation, containing mineral salts.

Vincetoxicum (Swallow-wort; White swallow-wort).
Derivation: Root of Vincetoxicum officinale.
Habitat: Mountainous Europe.
Grades: Technical.
Containers: Bags.
Uses: Veterinary medicine.
Railroad shipping regulations: None.*

Vine Black. See under Blacks, Vegetable black.

Vinegar Acid. See Acetic acid.

Vinegar Naphtha. See Ethyl acetate.

Vinegar Salts. See Calcium acetate.

Vinegars.
A variety of liquids produced by the acetic fermentation of alcoholic liquids. They are essentially dilute impure solutions of acetic acid. The principal vinegars are:
Brown vinegar. See Malt vinegar.
Cider vinegar. Yellow color; sp.gr. 1.013 to 1.015; acetic acid content 3.5 to 6%.
Distilled vinegar. White color, usually distilled from malt vinegar.
Glucose vinegar. See Sugar vinegars.
Malt vinegar (Brown vinegar). Brown color; characteristic odor; sp.gr. 1.014 to 1.021; acetic acid content 4.3 to 5.9%.
Proof vinegars. Minimum acetic acid content, United States 4.6%, France 8 to 9%, Germany 6%, Austria 6%, Belgium 5.6%, Russia 5%, Great Britain 4%.
Sugar vinegars (Glucose vinegar). Prepared by the conversion of starch substances into sugar, by the action of dilute acids, followed by fermentation and acetification. Said to be used for adulterating wine vinegar.
Orleans vinegar. See Wine vinegar.
White vinegar. See Wine vinegar.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Wine vinegar (Orleans vinegar; White vinegar). Pale yellow to red color. Alcoholic odor; sp.gr. 1.014 to 1.015; acetic acid content 6 to 12%.
Wood vinegar. See Acetic acid.

Vinic Ether.
Corruption of the French term "Vinique Ether." Refers to sulfuric ether which is commonly referred to as "ether" (q.v.).

Vinylbenzene. See Styrene.

Vinyl Trichloride. See Ethylene chloride.

Vinylite. A proprietary name for a synthetic resin which is colorless and transparent to white and opaque. It is stated to be suitable for molding, paints, lacquers, varnishes, and for impregnating wood, fabric, paper, etc., to make it water-proof and vapor-proof.

Vioform. See Iodochloroxyquinoline.

Viper Oil. See Adder oil.

Virgin Drop Black. See under Blacks, Animal black.

Virginia Snake Root. See Serpentaria.

Viscose Silk. See Rayon.

Vitreous Antimony. See Antimony sulfide.

Vitriol, Blue. See Copper sulfate, also Chalcanthite.

Vitriol, Cyprian. A vitriol produced at Chessy corresponding to the formula $CuSO_4.3ZnSO_4.28H_2O$.

Vitriol, Green. See Ferrous sulfate.

Vitriol, Iron. See Ferrous sulfate.

Vitriol, Lead. Anglesite (q.v.).

Vitriol, Mixed. See Vitriol, Salzburg, also see Vitriol, Cyprian.

Vitriol, Oil of. See Sulfuric acid.

Vitriol, Salzburg. A vitriol produced at Buxweiler corresponding to the formula $CuSO_4.3FeSO_4.28H_2O$.

Vitriol, White. See Zinc sulfate; also Goslarite.

Vitriol, Zinc. See Zinc sulfate, also Goslarite.

Vivianite (Blue iron earth; Blue iron ore) $Fe_3(PO_4)_2.8H_2O$.
A natural hydrated ferrous phosphate. Colorless when unaltered but gradually changing to blue or bluish-green on exposure; colorless to bluish-white streak changing to indigo blue and liver brown; vitreous or pearly luster. Contains 43.0% FeO, 28.3% P_2O_5.
Constants: Sp.gr. 2.58 to 2.69; hardness 1.5 to 2.
Occurrence: United States (New Jersey, Virginia, Colorado, Kentucky), Canada, England, Germany, Translyvania, Japan, Russia, Austria, Guatemala, Bolivia, Australia, Greenland.

Volborthite. Natural hydrous vanadate of copper, barium and calcium. Occurrence: United States (Utah); Russia.

Volcanic Ash (Volcanic tuff). A material made up of either loose or solidified small fragments and dust of lava, commonly glassy in character, blown from a volcano and deposited either on land or under water. If numerous large fragments are embedded in the ash, the deposit is called volcanic agglomerate or volcanic breccia. Found in Colorado, Montana, Nevada, Oklahoma and South Dakota. Used as an abrasive and building stone and in the manufacture of fire-brick, hydraulic mortar and concrete.

Volcanic Glass. See Obsidianite.

Volcanic Tuff. See Volcanic ash.

Volhard's Solution. A solution of potassium sulfocyanate used in analytical chemistry.

Vomit Nut. See Nux vomica.

Vulcan Coal Powders. United States permissible explosive classified by the United States Bureau of Mines as follows: (See Explosives, permissible for explanation of classification.)

Variety Number	Volume of Poisonous Gases Class	Characteristic Ingredient Class
1	C	4
2	B	4

Vulcanite. Hard rubber.

Vulcanized Fiber.
Color and properties: Reddish-brown, gray or black material of horny consistency. Oilproof. Absorbs 20 to 50% of its weight of water on prolonged immersion but dries again to its original size. Very resistant to chemical action but subject to the action of mineral acids upon prolonged exposure.
Constants: Sp.gr. 1.3 to 1.5; tensile strength 8,000 to 13,000 lbs. per sq. in.; crushing strength 35,000 to 45,000 lbs. per sq. in.; dielectric strength 200 to 400 volts per mil.
Insoluble in organic solvents.
Derivation: By running unsized, unloaded rag paper through a warm solution of zinc chloride, winding upon a roll until the desired thickness is obtained, cutting it off and washing in zinc chloride solutions of diminishing strength and finally in pure water until no test for chlorides is obtained.
Uses: Trunks; bags; handles of cheap cutlery; receptacles; gears; washers; valves; etc.
Railroad shipping regulations: None.*

Vulpinite. See Anhydrite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

W

"W. V." Black. See under Blacks.

Wad (Bog manganese).
Mixture of manganese oxides, often with oxides of other metals. Dark brown or black in color; often soft and loose, but sometimes hard and compact. Luster, dull. Contains 10 to 20% of water.
Constants: Sp.gr. 3 to 4.26; hardness 0.5 to 6.
Occurrence: United States (Large deposits in Montana, also found in sixteen other states), Canada (New Brunswick), Norway.
Uses: Manufacture of chlorine; paint.

Wad Clay. See under Clays.

Wagnerite $(MgF)MgPO_4$ or $Mg_3P_2O_8.MgF_2$.
A natural fluophosphate of magnesium. Color, different shades of yellow, sometimes grayish, flesh red or greenish; white streak; vitreous luster. Contains 43.8% P_2O_5, 49.3% MgO, 11.8% F. Some calcium may replace part of the magnesium.
Constants: Sp.gr. 2.98 to 3.14; hardness 5 to 5.5.
Occurrence: Austria, Norway (here it is the dominant mineral in some of the phosphate veins).

Wahoo. See Euonymus.

Walnut Oil.
Color and properties: The cold-pressed oil is a colorless or pale yellowish-green liquid; pleasant odor; agreeable, nutty taste. The hot-pressed oil has a greenish tint and an acrid taste and odor.
Constants: Sp.gr. 0.919 to 0.929; saponification value 188 to 196; iodine value 143 to 148; refractive index 1.4808.
Soluble in alcohol, ether, chloroform and carbon bisulfide.
Derivation: By expressing the seeds of Juglans regia.
Method of purification: Filtration.
Grades: Technical.
Containers: Wooden barrels.
Uses: Varnishes; paints.
Railroad shipping regulations: None.*

Walvewite. See Micas, brittle.

Ware Clay. See under Clays.

Washing Blue. See Iron blues; also Laundry blue.

Washing Soda. See Sal soda.

Wasite. See Allanite.

Watch Oil. A high fish oil.

Water Dag. See Aqua-dag.

Water Elder. See Viburnum opulus.

Water Gas.
A gas made by decomposing steam by passing it over a bed of incandescent coke. In the operation of the water-gas generator after the bed of incandescent coke is partly quenched by the "make" or "steam blow" it is revived by an "air blow." Approximate composition:

	Per Cent
Illuminants	0.0
Carbon monoxide	40.9
Hydrogen	50.8
Methane	0.2
Carbon dioxide	3.4
Oxygen	0.9
Nitrogen	3.5
B.t.u.	299

This gas is known as "blue water gas." For illuminating purposes water gas, which burns with a non-luminous flame, is brought in contact with oil vapor. This gas is known as "carburetted water gas" (q.v.).

Water Gas, All Oil.
A gas made by decomposing oil and steam in one operation. A typical gas will analyze 7.0% illuminants, 9.2% carbon monoxide, 39.8% hydrogen, 34.6% methane, 2.6% carbon dioxide, 0.2% oxygen, 6.6% nitrogen. Candle power, 19.7, B.t.u. 680.
Uses: Industrial and domestic heating and lighting.

Water Gas, Blue. See Water gas.

Water Gas, Carburetted. See Carburetted water gas.

Water Glass. See Sodium silicate.

Water Hemlock. See Cicuta.

Water, Lead. An aqueous solution of lead acetate.

Water, Lime. An aqueous solution of calcium hydroxide.

Water of Ammonia. See Ammonium hydroxide.

Water-soluble Oils.
Ammonia, potash, or soda soaps of oleic, sulfofatty, rosin, or naphthenic acids dissolved in mineral oils. Sometimes the rosin oils are first blown (see blown oils) and sometimes ammoniacal liquor, naphtha or alcohol is added. The final products form permanent emulsions or almost clear solutions with water.
Uses: Boring; lathe-cutting; milling; polishing lubricants; dressing textile fibers in spinning and weaving; dust laying.

Water, Sulfuretted Hydrogen. An aqueous solution of hydrogen sulfide.

Water-white Oil. See Illuminating oils.

Waterproofing Salts. See Aluminum acetate.

Wattle (Mimose; Wattle bark).
Derivation: From the Austrian wattles, Accacia pycnantha, Acacia mollissina and Acacia binervata.
Grades: Based on tannin content; 25% extract.
Containers: 110, 150, 250 lb. bags; extract; 450-500 lb. barrels.
Uses: Tanning industry.
Railroad shipping regulations: None.*

Wattle Bark Extract. See Wattle.

Wattle Gum. A species of acacia. See also Arabic gum.

Wavellite.
$Al_6(OH)_6(PO_4)_4.9H_2O$ or $4AlPO_4.2Al(OH)_3.9H_2O$.
A natural hydrated basic aluminum phosphate. Color, white grading to yellow, green, gray, brown or black; white streak; vitreous to pearly or resinous luster. Contains 38.0% Al_2O_3, 35.2% P_2O_5, balance water, sometimes with some fluorine.
Constants: Sp.gr. 2.31 to 2.34; hardness 3.25 to 4.
Occurrence: United States (Arkansas, Pennsylvania, North Carolina), England, Bohemia, Germany, Belgium, France, Brazil.
Uses: Has been used for the manufacture of phosphorus.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Wax-berry. See Myrica.

Wax Butter. A thick oil composed, chiefly, of cerotene, melissine, and palmitic acid.

Derivation: By distillation of beeswax.

Uses: Medicine.

Wax Distillate. See Neutral oil.

Wax Tailings.

A yellow, sticky, semi-asphalt product obtained in the destructive distillation of petroleum tar just prior to the formation of the coke. It contains anthracene, chrysene and other products formed by the destructive distillation.

Uses: Ingredient of waterproofing compounds, paving mixtures, cheap axle greases.

Railroad shipping regulations: None.*

Waxes.

Text books usually define waxes as unctuous, fusible, variably viscous to solid substances, having a characteristic waxy luster, which are insoluble in water but usually soluble in carbon bisulfide, benzene, etc., and which are extremely susceptible to changes in temperature and whose origin, composition and color are variable. Waxes are usually grouped according to their origin as follows: (a) Animal: spermaceti, beeswax, stearic acid, chinese insect wax, etc. (b) Mineral: ozokerite, montan, ceresin, paraffin, etc. (c) Vegetable: carnauba, Japan, bayberry, candelilla, etc. In addition, there is a number of artificial waxes obtained from the distillation of paraffin-base petroleum, ozokerite, etc., and from the destructive distillation of lignite and paraffinaceous shales. For additional data see under each specific wax. Certain waxes, classified according to use, are listed below:

Waxes, Combination.

A combination wax, having to a large extent the properties of both saturating and finishing waxes, and used for saturating and finishing rubber-covered wire in one operation.

See Waxes, saturating; Waxes, finishing; Saturating compounds.

Waxes, Finishing.

Waxes used for depositing an outside coating on saturated rubber-covered wire. Such waxes must have a high melting point, be capable of taking a high polish and have great flexibility to avoid cracking and chipping when the wire is bent.

Constants of typical wax: M.p. 163°F.; sp.gr. 0.9913 (60°F.); viscosity 5.62 to 13.27 (290° to 250°F.); penetration, 0.0 to 35.0 (70° to 120°F.).

See Waxes, saturating; Waxes, combination; Saturating compounds.

Waxes, Saturating.

Waxes used for saturating rubber-covered wire. Such waxes must be of low viscosity and medium melting point and capable of penetrating the covering at a temperature of from 210° to 300°F.

Constants of typical wax: M.p. 120°F.; sp.gr. 0.9877 (60°F.); viscosity 1.71 to 2.80 (290° to 210°F.); penetration 18.0 to 65.0 (70° to 120°F.).

See Waxes, finishing; Waxes, combination; saturating compounds.

Railroad shipping regulations: None.*

Websterite. See Aluminite.

Wehrlite (Telluric bismuth; Bismuth ditelluride) Bi_3Te_2 or Bi_8Te_5S.

Pale steel-gray mineral with gray streak, metallic luster. Contains 70.02% bismuth, 28.52% tellurium, 1.33% sulfur, 0.48% silver. See also Tetradymite, Joseïte, Grünlingite.

Constants: Sp.gr. 8.4; hardness 1.5 to 2.

Occurrence: Hungary.

Wernerite.

A complex natural silicate of calcium and aluminum which also contains some soda and chlorine. It belongs to the scapolite group of minerals which are supposed to be isomorphous mixtures of marialite ($Na_4Al_3Si_9O_{24}Cl$) and Meionite ($Ca_4Al_6Si_6O_{25}$). It is intermediate between meionite and marialite and corresponds to a molecular combination of the two in the ratio, Me:Ma from 3:1 to 1:2. Silica ranges from 46 to 54%. Color, gray, white, green, bluish, reddish; white or uncolored streak; vitreous to dull luster. Closely related to mizzonite (q.v.).

Constants: Sp.gr. 2.66 to 2.73; hardness 5 to 6.

Occurrence: United States (Vermont, Massachusetts, New York, New Jersey, Pennsylvania), Canada, Finland, Norway, Sweden, Bavaria, Siberia.

West India Kino (Jamaica kino).

Color and properties: Smooth, shining, dark, reddish-brown to black, rectangular fragments. Thin splinters, translucent and ruby red. Odorless. Very astringent, bitter taste.

Soluble in water (89%); alcohol (94%).

Derivation: By evaporating a decoction of the wood and bark of Coccoloba uvifera L. (Fam. Polygonaceae).

Uses: Medicine [similar to kino (q.v.)].

Westfalite, Improved. See under Explosives, Westfalites, No. 2.

Wet Acid Scrap. See Fish scrap, wet.

Wetter-dynamite. See under Explosives, Dynamite, wetter.

Whale Oil (Train oil; Sperm oil; Body oil; Blubber oil.

Color and properties: Yellowish-brown, non-drying, fixed oil; strong fishy odor.

Constants: Sp.gr. 0.925 to 0.930; saponification value 188 to 193; iodine value 120.

Soluble in alcohol, ether, benzene, chloroform and carbon bisulfide.

Derivation: By boiling the blubber of the Greenland or other whales, and skimming off the oil.

Method of purification: Filtration.

Grades: Crude No. 1; crude No. 2; natural winter; bleached winter.

Containers: 375 lb. barrels; 8,000 gal. tank cars.

Uses: Leather dressing; lubrication; tempering steel; soap-making; illumination; fat manufacture (by hydrogenation); oleomargarine; plant insecticide.

Railroad shipping regulations: None.*

Wheat Oil. The oil obtained from bruised wheat.

Whetstone. A stone suitable for sharpening tools. Found in Arkansas, Connecticut, Indiana, Massachusetts, Michigan, New Hampshire, Rhode Island, and Vermont.

White Acid. A mixture of ammonium bifluoride and hydrofluoric acid used for etching glass.

White Arsenic. See Arsenic trioxide.

White Bole. See Kaolin.

White Cedar. See Thuja.

White, Charlton. See Lithopone.

White, Chinese. See Zinc oxide.

White Cinnamon. See Canella.

White Clay. See Kaolin.

White, Cremnitz. (Cremnitz white; Kremnitz white; Crems white; Silver white; Blanc d'argent; London white; Krems white; Nottingham white; Flake white). A series of pigments composed of lead carbonate and hydrated lead oxide. They differ principally in the amount of hydrated lead oxide contained. The terms flake white and pearl white are also applied to bismuth subnitrate (q.v.) and bismuth oxychloride (q.v.).

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

The term pearl white is also sometimes used synonymously with pearl essence (q.v.). Kremser white is stated to be the purest form of white lead.

White, Crems. See White, cremnitz.

White Elaterium. See Elaterium.

White, Flake. See White, cremnitz.

White, Griffith's. See Lithopone.

White Iron Pyrites. See Marcasite.

White, Kremnitz. See White, cremnitz.

White Lead. See Lead carbonate, basic.

White Lead, Sublimed. An amorphous white pigment, very uniform and fine in grain, obtained from the sublimation of galena at a high temperature. It produces an excellent paint whose wearing qualities at the seashore are superior to those of ordinary white lead and it has the additional advantage of not being so quickly acted upon by sulfur gases. The average composition is about as follows: Lead sulfate 75%, lead oxide 20%, zinc oxide 5%.

Railroad shipping regulations: None.*

White, London. See White, cremnitz.

White Metal. See Babbitt metal.

White Mineral Oil. See Petrolatum liquid.

White Mustard. See Sinapis alba.

White Nitrate of Lime BASF. See Calcium nitrate BASF.

White, Nottingham. See White, cremnitz.

White Oak Bark. See Quercus.

White, Orr's. See Lithopone.

White, Pearl. See White, cremnitz.

White, Permanent. See Blanc fixe.

White Poppyseed Oil. Obtained by cold-pressing poppy seeds.

White Portland Cement. See under Cements, structural, Portland cement, white.

White Precipitate. See Mercuric-ammonium chloride.

White Precipitate, Fusible. See Mercuric-ammonium chloride.

White Precipitate, Lemery's. See Mercuric-ammonium chloride.

White, Rubber-maker's. See Chalk.

White Senaar Gum. See Arabic gum.

White, Silver (Blanc d'argent). See White, cremnitz.

White Spirit. A term used in England for turpentine substitutes.

Typical constants: Sp.gr. 0.785; flash point, above 23°C. (mostly 26.7°C.).

Railroad shipping regulations: None(?)*

White Swallow-wort. See Vincetoxicum.

White Tar. See Naphthalene.

White Vaseline. See Petrolatum.

White Vitriol. See Zinc sulfate; also Goslarite.

White Walnut. See Juglans.

White Wax. See Beeswax.

White Wood Bark. See Canella.

White, Zinc. See Zinc oxide.

Whitewood. See Linden.

Whiting.

Chalk is the term used and understood generally in the trade to mean a crude product obtained from the chalk cliffs in England, France and Belgium. When this is ground, levigated and dried it produces the product called "Whiting" which, whether dried in the cake or otherwise, crumbles to a fine powder finer than 300 mesh with slight pressure. The physical properties and analysis of this "Whiting" varies, depending on the source of supply of the chalk, the process of manufacture and the care used in its production.

The approximate analysis of the dry "Whiting" should be 98% calcium carbonate, 1.50% silica, 0.50% iron and alumina and organic matter.

The only means of positively identifying this material is by a microscopical examination in which it differs from all other forms of calcium carbonate. This "Whiting" is classed by its fineness; Paris white is the finest grade, the coarser grades being known as "Extra Gilders Whiting," "Gilders Whiting" and "Commercial Whiting," the latter being quite coarse and of poor color. "Cliffstone Paris White" is prepared from a hard form of English chalk, ordinary chalk being a soft stone.

Of late years, however, the supply of these different grades is not so plentiful as it is now being manufactured by a new process by some of the larger producers and by this process there are but three grades; the finer or "Paris White" (of which there is only a limited amount produced) and the "Commercial" grade which is equivalent to the "Extra Gilders Whiting" and sometimes a very coarse material much coarser than the old "Commercial."

In recent years a number of products of calcium carbonate have been offered to the trade as "Whiting," these are generally limestone ground to a very fine mesh but not having the same physical characteristics as the true "Whiting" made from imported chalk. They are very often whiter and show a very much smaller silica content. Some of the producers are endeavoring to correct the confused nomenclature by marketing this product under the name pulverized limestone. One prominent producer markets a pulverized limestone of the following analysis:

	Per Cent
Calcium carbonate	98.87
Silica	0.32
Iron oxide and alumina	0.32
Magnesium carbonate	0.20
Sulfur trioxide	0.28

United States Bureau of Standards Recommended Specifications for Ceramic Whiting:

	Per Cent	
	Class 1	Class 2
Calcium carbonate	96 (min.)	89 (min.)
Magnesium carbonate	2 (max.)	8 (max.)
Iron Oxide	0.25 (max.)	0.25 (max.)
Silica	2 (max.)	2 (max.)
Sulfur trioxide	0.1 (max.)	0.1 (max.)

Whiting should not be confused either with prepared chalk (q.v.) or precipitated chalk (q.v.).

Railroad shipping regulations: None.*

Whortleberry. See Vaccinium.

Widia. A trade name for cemented tungsten carbide (q.v.).

Wigger's Anesthetic Ether. Ethyl chloride, polychlorated.

Wild Canilla. See Canella.

Wild Chamomile. See Matricaria.

Wild Cherry. See Prunus virginiana.

Wild Ginger. See Asarum.

Wild Ginger Oil. See Asarum canadense oil.

Wild Pepper. See Mezereum.

Wild Saffron. See Colchicum.

Wild Tobacco. See Lobelia.

Wild Woodbine. See Gelsemium.

Wilkinite. See Bentonite.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Willemite (Troostite)
Zn_2SiO_4, often with manganese replacing zinc. Greenish to yellow, white, red, gray, brown or blue resinous mineral. Contains 72.9% zinc oxide. Soluble in hydrochloric acid.
Constants: Sp.gr. 3.89 to 4.2; hardness 5.
Occurrence: United States (New Jersey, New Mexico, Arizona), Greenland, Germany.

Williamsite. An apple-green impure variety of serpentine. See Jade.

Williamson's Blue. See Iron blues.

Wind Flower. See Pulsatilla.

Wine Lees. A deposit or sediment which collects in the bottom of wine casks during the fermentation of wine. Wine lees vary greatly in quality, but usually contain from 20 to 35% potassium acid tartrate and up to 20% calcium tartrate. They also contain yeast cells, proteins, and other solid matter which was suspended in the grape juice.
Uses: Similar to argols (q.v.).
Railroad shipping regulations: None.*

Wine of Antimony. A solution of tartar emetic in sherry wine.
Used in medicine as a means of administering minute doses of tartar emetic, unofficial.

Wine-stones Oil. See Grape-seed oil.

Winter Bloom. See Hamamelis.

Winter Clover. See Mitchella.

Wintergreen. See Gaultheria.

Wintergreen Oil, Natural. See Gaultheria oil.

Wintergreen Oil, Synthetic. See Methyl salicylate.

Witch Hazel. See Hamamelis.

Witherite $BaCO_3$.
A natural barium carbonate usually found in veins with lead ores. Color, white, yellowish or grayish. Vitreous, inclining to resinous luster.
Constants: Sp.gr. 4.27 to 4.35; hardness 3 to 3.75.
Occurrence: United States (Kentucky, Lake Superior region), England (most important source), Germany, Austria, Japan.
Uses: Chemicals (barium dioxide, barium hydroxide, blanc fixe); plate glass and porcelain; brick making (prevents efflorescence and discoloration by soluble sulfates); rat poison.

Wocheinite. Austrian grade of bauxite (q.v.).

Wolfram. See Tungsten.

Wolfram White. Barium tungstate.

Wolframic Acid. See Tungstic acid.

Wolframite (Peanut ore). A series of minerals composed of tungstate of iron and manganese, $(Fe,Mn)WO_4$, containing, when the iron and manganese are in a ratio of 1 to 1, 76.4% WO_3. As the iron increases and the manganese decreases, wolframite grades into febrerite, the pure iron tungstate, $FeWO_4$, with 76.3% WO_3. At the other end of the series is hubnerite, the pure manganese tungstate, containing 76.6% WO_3. Found in or near granite veins, also in veins with copper, gold, silver, etc. Dark gray, black or reddish-brown in color with dark brown, yellowish-brown or gray streak. Resinous to sub-metallic luster. Partially soluble in hydrochloric acid.
Constants: Sp.gr. 6.8 to 7.55; hardness 5 to 5.5.
Occurrence: United States (Arizona, California, Connecticut, Nevada, New Hampshire, New Mexico, South Dakota, Texas, Virginia, Washington and Wyoming), India, Portugal, Australia, England, Argentine, Chile.
Uses: Source of tungsten.

Wolfsbane. See Aconite.

Wollastonite $CaSiO_3$.
A natural calcium silicate. Color, white grading to brown, red, gray, yellow; white streak; vitreous luster, pearly on cleavage surfaces.
Constants: Sp.gr. 2.8 to 2.9; hardness 4.5 to 5.
Occurrence: United States (New York, Pennsylvania, California), Finland, Germany, Italy.

Wood. Wood is composed, principally of cellulose and lignocellulose in about equal quantities, together with gums, resins, a variable amount of water, and inorganic matter left as ash when the wood is burned. Wood has a low calorific value, from 3,000 to 3,500 calories, and contains a considerable amount of moisture, the amount depending on the kind of wood, the season in which it is cut, and the extent it has been allowed to dry, being rarely less than 18%.
Typical analyses:

	C	H_2	N_2	O_2	Ash	Calories
			Per Cent			
Oak	50.16	6.02	0.09	43.36	0.37	4,620
Ash	49.18	6.27	0.07	43.91	0.57	4,711
Elm	48.99	6.20	0.06	44.25	0.50	4,728
Beech	49.06	6.11	0.09	44.17	0.57	4,774
Birch	48.88	6.06	0.10	44.67	0.29	4,771
Fir	50.36	5.92	0.05	43.39	0.28	5,035
Pine	50.31	6.20	0.04	43.08	0.37	5,085

Wood, Agatized. See Wood, silicified.

Wood Alcohol. See Methyl alcohol.

Wood Arsenate. A fibrous variety of Olivenite (q.v.).

Wood Ashes.
Official definitions of the Association of Official Agricultural Chemists.
Unleached wood ashes: "Ashes that result from burning unleached wood, which have had no part of their plant food extracted by contact with water or other solvent, and that contain 4% or more of water-soluble potash (K_2O)."
Leached wood ashes: "Ashes resulting from burning unleached wood, but as having had part of their plant food removed by artificial means or by exposure to rains, snows or other solvent."
Ashes from leached wood: "Unleached ashes resulting from burning wood that has been exposed to or digested in water or other liquid solvent, as in the extraction of dyes, so that a part of the plant food has been dissolved and removed."
Hardwood ashes unleached: "Ashes containing from 2 to 8% or more actual potash (K_2O), principally as carbonate.
Uses: Fertilizer.

Wood Copper. A fibrous variety of Olivenite (q.v.).

Wood Ether. See Methyl oxide.

Wood, Indurated. A wood hardened by impregnation with a phenol-formaldehyde product. Used in battery wells.

Wood Naphtha. See Methyl alcohol.

Wood-opal. See Opal.

Wood, Opalized. See Wood, silicified.

Wood, Petrified. See Wood, silicified.

Wood, Silicified (Petrified wood; Opalized wood; Agatized wood). A natural material composed of opal or chalcedony (agate) and formed by the replacement of wood by silica. The replacement of the woody matter by the silica takes place in such a way that the original form and structure of the wood is preserved. Found in Arizona, California, Colorado, South Dakota, Utah and Wyoming.

Wood Spirit. See Methyl alcohol.

Wood-tar. See Tar, wood.

Wood-tar Oil. See Tar oil, wood.

Wood Vinegar. See Pyroligneous acid.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Woodbine, Wild. See Gelsemium.

Wood's Metal. See table under Fusible metals.

Wool-fat. See Lanum.

Wool-fat Pitch. See Stearin and fatty acid pitches.

Wool-fat, Refined. See Lanum, anhydrous.

Wool. Grease. See Degras.

Wool-grease Pitch. See Stearin and fatty acid pitches.

Wool Milk. The milky solution obtained as a process step in the production of lanolin when wool fat is subjected to the action of a solution of either sodium carbonate, caustic soda, or a mixture of both.

Wool Pitch. See Stearin and fatty acid pitches.

Wool Stearin Pitch. See Stearin and fatty acid pitches.

Wool Wastes. Wool from old woollen materials which have been cut up for re-making into cloth. Some of the wool is so cut up as to cause rejection as unfit for spinning. Used as a fertilizer. Wool waste usually contains from 4 to 7% ammonia. Pure wool shoddy may contain as much as 15% nitrogen and is particularly valued by hop growers.

Railroad shipping regulations: None.*

Worm-grass. See Spigelia.

Wormseed. See Santonica.

Wormseed Oil, American (Chenopodium oil; Goosefoot oil).

Color and properties: Colorless or yellowish oil; characteristic penetrating, disagreeable odor; pungent, bitterish, burning taste.

Chief known constituents: Ascaridol; para-cymene; camphor.

Constants: Sp.gr. (good commercial oils) 0.965 to 0.990 (inferior oils), 0.93 to 0.965 (15°C.); optical rotation —4° to —8° 50′.

Solubility in alcohol: In 3 to 10 vols. of 70% alcohol (inferior and adulterated oils do not yield a clear solution).

Derivation: Distilled from the seeds and leaves of Chenopodium ambrosioides, L. (var. anthelminticum, Gray).

Containers: Bottles; tins.

Uses: Medicine.

Railroad shipping regulations: None.*

Wormseed Oil, Levant (Chenopodium oil, Levant).

Color and properties: Yellow essential oil; penetrating, disagreeable odor.

Chief known constituent: Cineole.

Constants: Sp.gr. 0.915 to 0.940 (15°C.); optical rotation —1° 50′ to —7°; refractive index, 1.465 to 1.469.

Solubility in alcohol: In 2 to 3 vols. and more of 70% alcohol.

Derivation: By distillation of the unexpanded flower heads of Artemisia maritima, L. (var. Stechmanni).

Containers: Bottles; tins.

Uses: Medicine.

Railroad shipping regulations: None.*

Wormwood Oil (Artemisia absinthium oil).

Color and properties: The oil from the fresh herb has a dark green color, while that from the dry herb is yellowish-green or yellowish-brown; becomes dark brown with age; strong, somewhat unpleasant odor; bitter, scratching, lingering taste.

Chief known constituents: Thujone, thujyl alcohol, phellandrene, cadinene.

Constants: The condition of the herb at the time of distillation and the length of the distillation influence greatly the properties of the oil, consequently there is considerable variation in the properties of the different market samples. Sp.gr. 0.901 to 0.954; refractive index 1.460 to 1.470; acid value, American, up to 2.2, French, up to 6.7; ester value, American, 46 to 89, French, 11 to 108.

Solubility in alcohol: In 1 to 2 vols. of 80% alcohol (additional solvent may cause opalescence and turbidity); usually soluble in all proportions of 90% alcohol.

Derivation: Distilled from the leaves of Artemisia absinthium, L.

Adulteration: Turpentine.

Containers: Bottles; tins.

Uses: Medicine.

Railroad shipping regulations: None.*

Wulfenite $PbMoO_4$, sometimes with Ca, Cr, V.

Yellow, orange or bright orange-red mineral of resinous luster. Found in veins with ores of lead. Contains molybdenum trioxide 39.3%, lead oxide 60.7%.

Constants: Sp.gr. 6.7 to 7.0; hardness 2.75 to 3.

Occurrence: United States (Massachusetts, New York, Pennsylvania, Nevada, Utah, New Mexico, Arizona), Carinthia, Hungary, Austria, Germany, Sardinia, Australia.

Uses: Ore of molybdenum.

Wurtzilite (Eonite; Egerite). An asphaltic mineral which is jet-black by reflected light and deep red in thin plates. It softens in hot water, toughens, and becomes more elastic. In a candle flame it softens and burns with a bright flame. It is practically insoluble in gasoline of 76°Bé., partly soluble in ether, carbon bisulfide and turpentine and less so in carbon tetrachloride. Found in Utah.

Wurtzite. A natural zinc sulfide of the same composition as sphalerite, ZnS, but hexagonal in its crystallization. Found in United States (Missouri, Montana), Bohemia, France, Cornwall, Baden.

Wych Hazel. See Hamamelis.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

X

Xanthene (Diphenylenemethane oxide) $CH_2(C_6H_4)_2O$.
Color and properties: Yellowish, crystalline leaflets.
Constants: M.p. 100.5°C.; b.p. 315°C.
Soluble in ether; slightly soluble in alcohol; very slightly soluble in water.
Derivation: By the condensation of phenol and ortho-cresol by means of aluminum chloride.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Xanthine (Ureous acid) $C_5H_2N_4(OH)_2$.
Color and properties: Yellowish-white powder.
Constants: B.p.: Sublimes with partial decomposition.
Soluble in potassium hydroxide; very slightly soluble in water.
Derivation: By the action of nitrous acid on guanine.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Xanthoconite $3Ag_2S . As_2S_5$.
A natural silver-arsenic sulfide. Color, orange-yellow.
Constants: Sp.gr. 5.
Occurrence: Germany.

Xanthophyl (Xanthophyll) $C_{40}H_{56}O_2$.
Yellow pigment which accompanies chlorophyll in green leaves of plants. It is especially found in autumn leaves and is believed to be the residue obtained by the fading of chlorophyll.

Xanthophyll. See Xanthophyl.

Xanthophyllite. See Micas, brittle.

Xanthorrhea Resin. See Accroides gum.

Xanthoxylin.
Color and properties: Brown powder.
Soluble in alcohol.
Derivation: Purified alcoholic extraction of prickly ash bark.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Xanthoxylum (Prickly ash; Toothache tree; Yellow wood; Angelica tree; Archangelica).
Dried bark of Xanthoxylum americanum or Clava-Herculis.
Habitat: Canada, south to Virginia and Missouri.
Grades: Technical; N.F.
Containers: Crates; burlap bags.
Uses: Medicine (remedy for rheumatism and toothache); source of xanthoxylin.
Railroad shipping regulations: None.*

Xanthydrol $HCOH(C_6H_4)_2O$.
Color and properties: Colorless solid.
Constants: M.p. 123°C.
Insoluble in water; slightly soluble in alcohol and benzene.
Derivation: Reduction of xanthone.
Method of purification: Recrystallization.
Grades: C.P. (analytical).
Containers: Glass bottles.
Uses: Determination of urea.
Railroad shipping regulations: None.*

Xenon Xe.
Color: Colorless wholly inert gas—does not combine chemically with any element.
Liquefies at: —106.9°C.
Derivation: By fractional distillation of liquid air.
Grades: Highest purity.
Containers: Hermetically sealed glass flasks.
Uses: Filling electrical luminescent tubes.
Railroad shipping regulations: Green gas label.

Xenotime.
A mineral which is essentially yttrium phosphate but containing also smaller amounts of the cerium metals and thorium. It shows considerable variation in color, specimens being reported as follows: yellowish-brown, reddish-brown, hair-brown, flesh-red, grayish-white, wine-yellow, pale yellow; streak, pale brown, yellowish or reddish; luster, resinous to vitreous.
Constants: Sp.gr. 4.45 to 4.56; hardness 4 to 5.
Occurrence: United States (Georgia, North Carolina, Colorado), Norway, Sweden, Switzerland, Brazil.

Xeroform. See Bismuth tribromophenate.

Xpdite No. 1.
A United States permissible explosive classified by the United States Bureau of Mines as follows:
Volume of poisonous gases: Class C.
Characteristic ingredient: Class 4.
Railroad shipping regulations: High explosive.
See Explosives, permissible.

Xylene (Dimethylbenzene; Dimethylbenzol) (a) Meta- (Isoxylene; Isoxylol); (b) Ortho-; (c) Para-. $C_6H_4(CH_3)_2$.
Color and properties: Clear, colorless, mobile liquid; characteristic odor; inflammable.
Constants: (a) Sp.gr. 0.8668; m.p. —54°C.; b.p. 139°C. (b) Sp.gr. 0.876; m.p. —28°C.; b.p. 142°C. (c) Sp.gr. 0.8621; m.p. 15°C.; b.p. 138°C.
Soluble in alcohol and ether; insoluble in water.
Derivation: By fractional distillation from crude xylene, obtained from solvent naphtha.
Method of purification: (b) Rectification.
Grades: (a) Technical; pure. (b, c) Technical.
Containers: 5 gal. cans; 5, 55, 110 gal. drums; 8,000 gal. tank cars.
Uses: Organic preparations; solvent; meta-xylidine; microscopy; artificial musk; removal of naphthalene from illuminating gas; preventing stopping up of gas pipes with naphthalene; lacquers and varnishes (solvent); solvent for rubber cements.
Fire hazard: Dangerous.*
Railroad shipping regulations: None.*

Xylenol $(CH_3)_2C_6H_3OH$.
Color and properties: White crystals. There are six isomers.
Constants: Sp.gr. 1.0362; m.p. 26° to 75°C.; b.p. 211° to 225°C.
Soluble in water, alcohol, ether and caustic soda solution.
Derivation: By fusing the xylenesulfonic acids with potassium hydroxide.
Method of purification: Crystallization.
Grades: Technical.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Containers: Tins; wooden kegs.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Xylidine (Aminodimethylbenzene; Aminoxylene) (a) Meta-; (b) Ortho-; (c) Para- $C_6H_3(CH_3)_2NH_2$.
Color and properties: (a) Colorless oil. (b) Yellow liquid; prone to darken on exposure to air and light. (c) White, crystalline solid or oil.
Constants: (a) Sp.gr. 0.9184; b.p. 215°C. (b) Sp.gr. 0.981 to 0.984; b.p. 212° to 215°C. (c) Sp.gr. 0.980; m.p. 15°C.; b.p. 215°C.
(a, c) Soluble in alcohol and ether; insoluble in water. (b) Soluble in alcohol, ether and benzene; insoluble in water.
Derivation: (a) By the reduction of nitro-metaxylene. (b) By the reduction of nitroxylene with iron and hydrochloric acid. (c) By the nitration and reduction of para-xylene.
Grades: Technical.
Containers: 500, 800 lb. iron drums; 8,000 gal. tank cars.
Uses: Dyes; intermediates.
Railroad shipping regulations: None.*

Xyloidin. A nitrocellulose (q.v.).

Xylolite. See under Cements, constructional, Magnesium oxychloride cement.

Xylolith. See under Cements, constructional, Magnesium oxychloride cement.

Xylols, Meta-, Ortho- and Para-. See Xylene.

Xylonite. A pyroxylin plastic.

Xylose. A dextro-rotatory 5-carbon sugar obtained from cottonseed hull bran. It was formerly classed among the rare sugars, but recent investigations have placed its production on a semi-commercial scale. The bran is digested with hot water under pressure then washed with cold water followed by treatment with cold dilute sulfuric acid to remove the ash. Hot dilute sulfuric acid under steam pressure hydrolyzes the xylan to xylose. The acid is neutralized with lime and the xylose solution evaporated and crystallized. It may be marketed in the syrup form or purified by recrystallization and sold as crystalline xylose.

Xylyl Bromide (Tolyl bromide) $CH_3C_6H_4CH_2Br$. A military poison gas used in the late war.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Y

Yara-Yara. See Naphthylmethyl ether, beta-.

Yarrow. See Achillea.

Yaw Root. See Stillingia.

Yeast (Barm).
Color and properties: Yellowish-white, viscid, liquid or soft mass, consisting of the cells and spores of Saccharomyces cerevisiae.
Derivation: A ferment obtained in brewing.
Grades: Technical; brewing; cooking; compressed.
Containers: Tins; boxes.
Uses: Fermentation of sugars, molasses and cereals for alcohol; brewing; medicine; baking bread and the like.
Railroad shipping regulations: None.*

Yellow Brazil-wood. See under Fustic, Old fustic.

Yellow Calisaya Bark. See Cinchona bark, calisaya.

Yellow Cinchona Bark. See Cinchona bark, calisaya.

Yellow Cobalt. See Cobalt-potassium nitrite.

Yellow Copper. See Chalcopyrite.

Yellow Dock. See Rumex.

Yellow Gentian. See Gentian.

Yellow Jasmin. See Gelsemium.

Yellow Moccasin. See Cypripedium.

Yellow Moccasin Flower. See Cypripedium.

Yellow Mustard. See Sinapis alba.

Yellow Nankin. See Iron buff.

Yellow Precipitate. See Mercuric oxide.

Yellow Prussiate of Potassium. See Potassium ferrocyanide.

Yellow Prussiate of Sodium. See Sodium ferrocyanide.

Yellow Puccoon. See Hydrastis.

Yellow Root. See Hydrastis.

Yellow Saunders. See Santalum album.

Yellow Ultramarine. See Chrome yellows.

Yellow, Uranium. See Sodium uranate.

Yellow Uranium Oxide. See Sodium uranate.

Yellow Wax. See Cera alba.

Yellow Wood. See Xanthoxylum; also under Fustic, Old fustic.

Yerba Maté. The leaves of a tree found in Paraguay. Used in South America in the same manner as tea, for a beverage.

Yerba Santa. See Eriodictyon.

Ylang Ylang Oil (Cananga oil; Mosoi flower oil; Anona oil).
A yellow essential oil of delicate odor obtained by distillation of the flowers of Cananga odorata, Hook f. et Thomson, the principal sources of the commercial oil being the Philippines, Java and Réunion. In the Philippines the first fractions which come over during the distillation are separated and sold as ylang ylang oil since they contain the constituents of more delicate and fragrant odor. The later fractions are sold as cananga oil. A different practice is employed in Java, the total distillate being there collected and termed cananga oil. Inasmuch as the separation previously mentioned is controlled solely by the sense of smell there is wide variation in the properties of the various market samples.
Constants:
Manila ylang ylang oil: Sp.gr. 0.911 to 0.958 (30°/4°); optical rotation —27° to —49° 7′ (mostly —32° to —45°); refractive index 1.4747 to 1.4940 (rarely over 1.4900); ester value 90 to 150 (usually 100 or more).
Réunion ylang ylang oil: Sp.gr. 0.932 to 0.962 (15°C.); optical rotation —34° to —64°; ester value 96 to 134.
Cananga oil (presumably Java or Manila): Sp.gr. 0.906 to 0.950 (15°C.); optical rotation —17° to —55°; refractive index 1.495 to 1.510; acid value up to 2.0; ester value 10 to 35. Soluble in 1 to 2 vols. of 95% alcohol (turbidity appears on the addition of more than this quantity of alcohol).
Adulteration: Coco-nut fat, fatty oils, turpentine oil, alcohol, petroleum.
Uses: Medicine; perfumery.
Railroad shipping regulations: None.*

Yohimbine $C_{23}H_{32}N_2O_4$.
Color and properties: Glistening, needle-like alkaloid; poisonous!
Constants: M.p. 231°C.
Soluble in alcohol and ether; very slightly soluble in water.
Derivation: By extraction from the bark of Corynanthe yohimbe.
Method of purification: Crystallization.
Grades: Technical.
Containers: ⅛, ¼, 1 oz. vials.
Uses: Medicine.
Railroad shipping regulations: None.*

Yolk Oil. A substitute for egg yolk. It finds exclusive application in the fur-dyeing industry, where it is employed for softening dyed fur pelts. It is perfectly soluble in water, and when applied to the pelts, softens and nourishes.

Yperite. See Dichlorodiethylsulfide.

Ytterbia. See Ytterbium oxide.

Ytterbite. See Gadolinite.

Ytterbium (Neo-ytterbium) Yb. One of the rare earth (q.v.) metals.

Ytterbium Oxide (Ytterbia) Yb_2O_3.
Color and properties: Colorless mass when free of thulia but tinted brown or yellow when containing thulia. The weakest base of the yttrium group with the exception of scandia and lutecia.
Soluble in hot, dilute acids, less so in cold acids.
Constants: Sp.gr. 9.175; specific heat 0.0646.
Railroad shipping regulations: None.*

Ytteroilmenite. See Samarskite.

Yttria. See Yttrium oxide.

Yttrialite. One of the rare earth minerals. It is a silicate of the yttrium metals (43 to 47%), thorium (10 to 12%), and cerium metals (5 to 8%). Color on the fresh fracture olive-green, changing to orange-yellow on surface.
Constants: Sp.gr. 4.575.
Occurrence: Texas.

Yttrium Yt.
Color and properties: Dark gray metal.
Constants: Sp.gr. 3.80; m.p. 1,250°C.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Soluble in dilute acids and potassium hydroxide solution; decomposes in water.
Derivation: From yttrium oxide by electrolysis.
Impurities: Rare earths.
Grades: Technical.
Containers: Wooden kegs.
Uses: Incandescent gas mantles.
Railroad shipping regulations: None.*

Yttrium Acetate $Yt(C_2H_3O_2)_3.8H_2O$.
Color and properties: Colorless crystals.
Soluble in water.
Derivation: By the action of acetic acid on yttrium oxide.
Method of purification: Crystallization.
Impurities: Rare earths.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Yttrium Carbonate $Yt_2(CO_3)_3.3H_2O$.
Color and properties: Reddish-white to white powder.
Soluble in acids; insoluble in water, alcohol and ether.
Derivation: By the interaction of solutions of yttrium chloride and sodium carbonate.
Impurities: Erbium salts.
Grades: Technical.
Containers: Wooden kegs.
Uses: Incandescent gas mantles.
Railroad shipping regulations: None.*

Yttrium Chloride $YtCl_3.6H_2O$.
Color and properties: Reddish-white, transparent, deliquescent prisms.
Constants: Sp.gr. 2.575; m.p.: Decomposes at 100°C.
Soluble in water; sparingly soluble in alcohol; insoluble in ether.
Derivation: By the action of hydrochloric acid on yttrium oxide.
Method of purification: Crystallization.
Impurities: Erbium salts.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Yttrium Nitrate (a) $Yt(NO_3)_3.6H_2O$; (b) $Yt(NO_3)_3.4H_2O$.
Color and properties: Reddish-white crystals.
Soluble in water, alcohol and nitric acid.
Derivation: By the action of nitric acid on monazite sand.
Method of purification: Crystallization.
Impurities: Rare earths.
Grades: Technical.
Containers: Glass bottles.
Uses: Production of yttrium oxide.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Yttrium Oxide (Yttria) Yt_2O_3.
Color and properties: Yellowish-white powder.
Constants: Sp.gr. 5.35.
Soluble in dilute acids; insoluble in water.
Derivation: By the ignition of yttrium nitrate.
Impurities: Rare earths.
Grades: Technical.
Containers: Wooden kegs.
Uses: Incandescent gas mantles.
Railroad shipping regulations: None.*

Yttrium Sulfate $Yt_2(SO_4)_3.8H_2O$.
Color and properties: Small reddish-white, monosymmetric crystals.
Constants: Sp.gr. 2.558.
Soluble in concentrated sulfuric acid; sparingly soluble in water; insoluble in alkalis.
Derivation: By the action of sulfuric acid on monazite sand.
Method of purification: Crystallization.
Grades: C.P.
Containers: Glass bottles.
Uses: Reagent.
Railroad shipping regulations: None.*

Yttrotantalite. One of the rare earth minerals. It contains 46.25% tantalum oxide, 12.32% columbium oxide, 2.36% tungstic oxide, 10.52% yttria, 6.71% erbia, 2.22% ceria, 1.61% urania, 3.80% iron oxide, 5.73% calcium oxide, 1.12% stannic anhydride.
Color: Black, brown, brownish-yellow, straw-yellow. Streak, gray to colorless. Luster, submetallic to vitreous and greasy.
Constants: Sp.gr. 5.5 to 5.9; hardness 5 to 5.5.
Occurrence: Norway, Sweden, Russia.

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Z

"Z3." A flotation reagent said to be potassium xanthate (93 to 95%). Containers: 50, 250 lb. drums.

"Z4." A flotation reagent said to be sodium xanthate (92 to 95%). Containers: 50, 250 lb. drums.

"Z5." A flotation reagent said to be amyl xanthate. Containers: 50, 250 lb. drums.

Zaffre.
Derivation: A crude cobalt oxide, made by roasting smaltite, cobaltite, or cobalt-nickel pyrites.
Grades: Technical.
Containers: Wooden kegs.
Uses: Blue pigment.
Railroad shipping regulations: None.*

Zamak. Proprietary name for a zinc-base die-casting alloy said to contain 4% aluminum, 3% copper, 0.1% magnesium and the rest zinc.

Zanzibar Gum. See Animi gum.

Zapota Gum. See Chicle gum.

Zaratite. A natural, massive, vitreous emerald-green hydrous nickel carbonate, $NiCO_3.2Ni(OH)_2.4H_2O$. Occurs usually in an incrustation. Found in Maryland.

Zea (Corn-silk). Fresh styles and stigmas of Zea mays, the silk of the ear of ordinary Indian corn.
Habitat: United States and Hungary.
Grades: Technical; N.F.
Containers: Boxes.
Uses: Medicine (diuretic).
Railroad shipping regulations: None.*

Zedoary Oil.
Color and properties: Pale yellow, essential oil; camphor-like odor.
Chief known constituent: Cineole.
Constants: Sp.gr. 0.992 to 1.010.
Soluble in alcohol, ether, acetone, chloroform and carbon bisulfide.
Derivation: Distilled from the rhizome of Curcuma zedoaria, habitat: India.
Method of purification: Rectification.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Medicine.
Railroad shipping regulations: None.*

Zentralin. See Dimethyldiphenylurea.

Zeobromal. The ethyl ester of dibromohydrocinnamic acid. Used in medicine as a sedative, unofficial.

Zeolites.
A group of minerals occurring in cracks and cavities of igneous rocks, especially the more basic lavas. They are hydrous silicates of aluminum with either sodium or calcium or both, and rarely barium or strontium. Before the blowpipe most of the zeolites fuse readily and with strong intumescence, whence their name derived from the Greek, of "boiling stone." Acids decompose them with gelatinization and substitution products have been made by the use of several reagents. The principal members of this group are given below:

Name	Formula	Specific Gravity	Hardness
Natrolite	$Na_2Al_2Si_3O_{10}.2H_2O$	2.2 to 2.25	5 to 5.5
Analcine	$NaAlSi_2O_6.H_2O$	2.2 to 2.29	5 to 5.5
Stilbite	$CaAl_2Si_6O_{16}.6H_2O$	2.09 to 2.2	3.5 to 4
Heulandite	$CaAl_2Si_6O_{16}.5H_2O$	2.18 to 2.22	3.5 to 4
Chabazite	$CaAl_2Si_4O_{12}.6H_2O$	2.08 to 2.16	4 to 5
Thomsonite	$(CaNa_2)Al_2Si_2O_8.2\frac{1}{2}H_2O$		

A series of minerals whose mode of occurrence is similar to that of the zeolites and which resemble them are listed below.

Name	Formula	Specific Gravity	Hardness
Apophyllite	$H_{14}K_2Ca_8(SiO_3)_{16}.9H_2O$	2.3 to 2.4	4.5 to 5
Pectolite	$HNaCa_2(SiO_3)_3$	2.68 to 2.78	5
Prehnite	$H_2Ca_2Al_2(SiO_4)_3$	2.8 to 2.95	6 to 6.5
Datolite	$Ca(BOH)SiO_4$	2.9 to 3	5 to 5.5

Uses: The artificial zeolites are used for purifying water.

Zibeth. See Civet.

Zinc (Blue powder) Zn.
Color and properties: Shining, white metal; bluish-gray luster; or gray powder. Not found native. See Calamine, Franklinite, Hydrozincite, Nicholsonite, Smithsonite, Sphalerite, Willemite, Wurtzite, Zincite.
Constants: Sp.gr. 7.142; m.p. 419°C.; b.p. 918°C.
Soluble in acids and alkalis; insoluble in water.
Derivation: By roasting zinc ore in a reverberatory furnace, then heating with carbon out of contact with air. Obtained also electrolytically from zinc concentrates.
Forms available: Slab; rolled (strip, sheet, rod, tubing); wire; mossy; dust; anodes.
Uses:
Slab zinc:
Galvanizing and Electroplating: Wire, sheets, culverts, hardware, structural shapes, etc.
Manufacture of Non-ferrous Alloys: Brass, nickel, manganese bronze, tombec imitation gold.
Manufacture of Rolled Zinc.
Zinc Castings: Slush castings; battery zincs; electroplating, anodes.
Rolled zinc:
Automotive Equipment: Running board moldings, dome lamp rims, hub caps, escutcheon plates, scuff plates, curtain frames, drip and body molding, tire valve nuts, gasoline tank caps, auto body lining.
Electrical Apparatus: Fuses, anodes, meter cases, insulator caps, ground plates, dry battery cups.
Household Furnishings: Linoleum bindings, fruit jar caps, ice bag caps, laundry tags, wash boards.
Building Materials: Roofing, siding, leaders and conductors, gutters, flashings, shingles, fences, weather strips, corner beads, art glass strips, stair treads, pipe covering bands, glazier points, window bolt guards.
Railroad Car Linings.
Printing: Engravers' plates, lithographers' plates.
Miscellaneous: Cable wrappings, eyelets, addressing machine plates, buttons, grommets, pin tubes, etched name plates, shoe lace tips, ice box

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

drains and linings, foil, fence bands, templates, collapsible tube clips, embossed numbers and tags, gaskets, washing machine parts, casket ends, box linings, stencils, shoe nails, perforated screens, ornamental fittings, signs, organ pipes, hull plates, boiler plates.
Zinc dust: Chemicals (zinc salts, reducing agent in making sodium hydrosulfite for the reduction of vat colors); dyes (reduction of indigo blue); intermediates (reduction of nitrobenzene in the production of aniline, various syntheses); galvanizing by the Cowper-Cowles process; deoxidizing agent for bronzes; purification of fats; purifying agent in the treatment of solutions of zinc sulfate prior to electrolysis; manufacture of lithopone; bleaching bone glues; analytical reagent.
Mossy zinc: Stripping photographic solutions, soot cleaners, coloring face brick, photographic chemical manufacture.
Zinc Wire: Metal spraying.

Zinc Acetate $Zn(C_2H_3O_2)_2.2H_2O$.
Color and properties: White, monoclinic, crystalline plates; pearly luster.
Constants: Sp.gr. 1.72; m.p. 235° to 257°C.
Soluble in water and alcohol.
Derivation: By the action of acetic acid on zinc oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.; U.S.P.
Containers: 1, 5 lb. bottles and cartons; wooden kegs.
Uses: Medicine; preserving wood; textiles (mordant in dyeing with alizarin blue and similar dyes, resist in dyeing with aniline black, substitute for tartar emetic in dyeing with basic dyes, calico printing); zinc chromate.
Railroad shipping regulations: None.*

Zinc Alum. See Aluminum-zinc sulfate.

Zinc-ammonium Chloride $ZnCl_2.5NH_3.H_2O$.
Color and properties: White powder.
Grades: Technical.
Containers: 100 lb. kegs; 500 lb. barrels; 1,000 lb. casks.
Uses: Welding; soldering flux; dry batteries; galvanizing.
Railroad shipping regulations: None.*

Zinc Bichromate (Zinc dichromate) $ZnCr_2O_7$.
Color and properties: Orange-yellow powder.
Soluble in acids; insoluble in water, alcohol and ether.
Derivation: By the action of chromic acid on zinc hydroxide.
Grades: Technical.
Containers: Wooden kegs.
Uses: Pigment.
Railroad shipping regulations: None.*

Zinc Blend. See Sphalerite.

Zinc Bloom. See Hydrozincite.

Zinc Borate $ZnBO_3$.
Color and properties: White, amorphous powder.
Soluble in water.
Derivation: By the fusion of zinc oxide, potassium bifluoride and boron oxide.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Bromate $Zn(BrO_3)_2$.
Color and properties: White, deliquescent powder.
Constants: Sp.gr. 2.566; m.p. 100°C.
Derivation: By the interaction of barium bromate and zinc sulfate, with subsequent crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: Yellow label(?)*

Zinc Bromide $ZnBr_2$.
Color and properties: White, hygroscopic, crystalline powder.
Constants: Sp.gr. 4.219; m.p. 394°C.; b.p. 650°C.
Soluble in water, alcohol and ether.
Derivation: By the interaction of solutions of barium bromide and zinc sulfate, with subsequent crystallization.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Glass bottles.
Uses: Medicine; photography (plates, papers).
Railroad shipping regulations: None.*

Zinc Carbolate. See Zinc phenate.

Zinc Carbonate $ZnCO_3$.
Color and properties: White, crystalline powder.
Constants: Sp.gr. 4.42 to 4.45; m.p.: Loses CO_2 at 300°C.
Soluble in acids, alkalis and ammonium salt solutions; insoluble in water.
Derivation: (a) By grinding the mineral smithsonite; (b) By the action of sodium bicarbonate on a solution of a zinc salt.
Method of purification: Crystallization.
Impurities: Zinc oxide; zinc hydroxide.
Grades: Technical; C.P.; U.S.P.
Containers: 1 lb. bottles; 25, 50 lb. boxes; 100, 150 lb. kegs.; 250, 300 lb. barrels.
Uses: Pigment; ceramics; fire-proofing agent; cosmetics and lotions; pharmaceuticals (ointments, dusting powders); zinc salts.
Railroad shipping regulations: None.*

Zinc Carbonate, Precipitated (Zinc subcarbonate) $2ZnCO_3.3Zn(OH)_2$.
Color and properties: Impalpable, white powder.
Soluble in dilute acids, ammonium hydroxide and ammonium carbonate solution; insoluble in water and alcohol.
Derivation: By the action of sodium carbonate on a solution of a zinc salt.
Impurities: Zinc oxide.
Grades: Technical; U.S.P.
Containers: Wooden barrels; tins.
Uses: Medicine (similar to zinc oxide); pigment.
Railroad shipping regulations: None.*

Zinc Chlorate $Zn(ClO_3)_2.6H_2O$.
Color and properties: Colorless, very deliquescent crystals; poisonous! Keep well stoppered.
Constants: M.p. 60°C.
Soluble in water, alcohol, glycerol and ether.
Derivation: By the interaction of zinc sulfate and barium chlorate, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles; iron drums.
Uses: Oxidizing agent.
Fire hazard: Dangerous.*
Railroad shipping regulations. Yellow label.

Zinc Chloride $ZnCl_2$.
Color and properties: White, granular, deliquescent crystals; poisonous! Keep well stoppered.
Constants: Sp.gr. 2.91; m.p. 262°C.; b.p. 730°C.
Soluble in water, alcohol glycerol and ether.
Derivation: By the action of hydrochloric acid on zinc or zinc oxide.
Method of purification: Recrystallization.
Grades: C.P.; U.S.P.; technical. Fused; crystal; granulated; 50% solution.
Containers: C.P. and U.S.P.: 1, 5 lb. bottles; 25 lb. jars. Fused: 100, 500, 900 lb. drums. Granulated: 25, 50 lb. tins; 500, 600 lb. barrels. Crystallized: 25 lb. cans; 100 lb. drums. Solution: 25 lb. cans; 100, 1,400 lb. drums; 50 ton tank cars.
Uses: Catalyst, dehydrating and condensing agent in organic synthesis; wood preservative; ingredients of soldering fluxes; burnishing and polishing compounds for steel; electroplating;

** See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

disinfectant; antiseptic and deodorant preparations; textiles (mordant, carbonizing agent, mercerizing, sizing and weighting compositions, resist for sulfur colors, albumin colors and para red); cold water glues and other adhesives; special cements; glass etching compositions; petroleum refining; parchment paper; vulcanized fiber; dental cements; dentifrices; embalming and taxidermists' fluids; candles; vulcanizing rubber; medicine (caustic, antiseptic).
Railroad shipping regulations: None.*

Zinc Chloroïodide. A mixture of zinc chloride and iodide.
Color and properties: White powder.
Soluble in water.
Containers: Glass bottles.
Grades: Technical.
Uses: Disinfectant; pharmaceutical preparations.
Railroad shipping regulations: None.*

Zinc Chromate $ZnCrO_4.7H_2O$.
Color and properties: Yellow, crystalline powder.
Soluble in acids.
Derivation: By the action of chromic acid on zinc hydroxide.
Grades: Technical; C.P.
Containers: 1 lb. bottles; kegs.
Uses: Pigment. See Chrome yellows.
Railroad shipping regulations: None.*

Zinc Chrysophanate
Color and properties: Brownish-red powder.
Soluble in alkaline solutions.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Citrate $Zn_3(C_6H_5O_7)_2.2H_2O$.
Color and properties: White, amorphous powder.
Slightly soluble in water.
Derivation: By the action of citric acid on zinc hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Cyanide $Zn(CN)_2$.
Color and properties: White powder; poisonous!
Constants: M.p.: Decomposes.
Soluble in dilute mineral acids; insoluble in water and alcohol.
Derivation: By precipitation of a solution of zinc sulfate or chloride with potassium cyanide.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Dichromate. See Zinc bichromate.

Zinc Dithiofuroate. See Furac II.

Zinc Ethyl $Zn(C_2H_5)_2$.
Color and properties: Colorless liquid; takes fire on contact with air.
Constants: Sp.gr. 1.18; b.p. 118°C.
Decomposes in water.
Derivation: By the action of ethyl iodide on zinc and sodium-zinc.
Grades: Technical.
Containers: Steel cylinders.
Uses: Organic synthesis.
Fire hazard: Dangerous.*
Railroad shipping regulations: Red label.

Zinc Ethylsulfate $Zn(C_2H_5SO_4)_2.2H_2O$.
Color and properties: Clear, colorless, hygroscopic, crystalline leaflets. Keep well stoppered.
Soluble in water and alcohol.
Derivation: By the interaction of zinc hydroxide and diethyl sulfate.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Organic synthesis.
Railroad shipping regulations: None.*

Zinc Ferrocyanide $Zn_2Fe(CN)_6.3H_2O$.
Color and properties: White powder.
Soluble in ammonium hydroxide; insoluble in water and hydrochloric acid.
Derivation: By the interaction of zinc sulfate and potassium ferrocyanide.
Grades: Technical.
Containers: Glass bottles; boxes.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc, Flowers of. See Zinc oxide.

Zinc Fluoride ZnF_2.
Color and properties: White powder.
Constants: Sp.gr. 4.612; m.p. 734°C.
Soluble in hot acids; slightly soluble in water; insoluble in alcohol.
Derivation: (a) By the action of hydrofluoric acid on zinc hydroxide; (b) By the addition of sodium fluoride to a solution of zinc acetate.
Grades: Technical.
Containers: Wooden kegs; glass bottles.
Uses: Ceramic glazes and enamels; impregnating lumber; galvanizing.
Railroad shipping regulations: None.*

Zinc Formate $Zn(CHO_2)_2.2H_2O$.
Color and properties: White crystals.
Soluble in water; insoluble in alcohol.
Derivation: By the action of formic acid on zinc hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Gallate. See Zinc subgallate.

Zinc Glycerinophosphate. See Zinc glycerophosphate.

Zinc Glycerophosphate (Zinc glycerinophosphate) $C_3H_5(OH)_2OPO_3Zn$.
Color and properties: White, amorphous powder.
Soluble in water; insoluble in alcohol and ether.
Derivation: By the action of glycerophosphoric acid on zinc hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Greens. Brilliant green pigments mostly consisting of mixtures of Prussian blue and zinc chromate. They are permanent to light but not to alkali or water. Mostly used for flat wall paints and interior work.

Zinc Hypophosphite $Zn(H_2PO_2)_2.H_2O$.
Color and properties: Colorless, hygroscopic crystals. Keep well stoppered.
Soluble in water and alkalis.
Derivation: By the action of hypophosphoric acid on zinc hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Iodate $Zn(IO_3)_2$.
Color and properties: White, crystalline powder.
Soluble in nitric acid and alkalis; very slightly soluble in water.
Derivation: By the interaction of barium iodate and zinc sulfate, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: Yellow label(?)*

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Zinc Iodide ZnI_2.
Color and properties: Hygroscopic, white, crystalline powder; sharp, saline taste. Keep well stoppered.
Constants: Sp.gr. 4.696; m.p. 446°C.; b.p. 624°C.
Soluble in water, alcohol and alkalis.
Derivation: By the interaction of barium iodide and zinc sulfate, with subsequent crystallization.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Wooden kegs; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Lactate $Zn(C_3H_5O_3)_2.3H_2O$.
Color and properties: White crystals.
Soluble in water.
Derivation: By the action of lactic acid on zinc hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Lead White, Standard.
A paint pigment usually consisting of a 50-50 mixture of lead sulfate and zinc oxide. Its use has diminished since the development of ozark white.
Railroad shipping regulations: None.*

Zinc Malate $ZnC_4H_4O_5.3H_2O$.
Color and properties: White, crystalline powder.
Soluble in water.
Derivation: By the action of malic acid on zinc hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Meta-arsenite. A timber preservative said to have toxic properties greater than zinc chloride and equal to copper arsenite. It is claimed that it is quite permanent, inexpensive and practically non-corrosive to iron. It is applied by the ordinary pressure methods.

Zinc Nitrate $Zn(NO_3)_2.6H_2O$.
Color and properties: Colorless lumps or crystals.
Constants: Sp.gr. 2.065; m.p. 36.4°C.; b.p. 131°C.
Soluble in water and alcohol.
Derivation: By the action of nitric acid on zinc or zinc oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.
Containers: Wooden kegs; glass bottles.
Uses: Medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Zinc Oleate $Zn(C_{18}H_{32}O_2)_2$.
Color and properties: Dry, white, greasy, granular powder.
Soluble in alcohol, ether, carbon bisulfide and benzine; insoluble in water.
Derivation: By the interaction of solutions of zinc acetate and sodium oleate.
Grades: Technical.
Containers: Tins; wooden kegs; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Oleostearate.
Color and properties: White amorphous powder. Insoluble in water, alcohol, ether.
Derivation: Interaction of zinc acetate with oleic and stearic acids, or of zinc sulfate with hand soap and curd soap.
Uses: Medicine (ointment in treatment of skin diseases, unofficial).
Railroad shipping regulations: None.*

Zinc Ore. See Calamine, Smithsonite, Franklinite and Zincite.

Zinc Ortho-phosphate. See Zinc phosphate.

Zinc Oxalate $ZnC_2O_4.2H_2O$.
Color and properties: White powder.
Constants: Sp.gr. 2.582.
Soluble in acids and alkalis; slightly soluble in water.
Derivation: By the interaction of zinc sulfate and sodium oxalate.
Grades: Technical; C.P.
Containers: 1 lb. bottles; boxes.
Uses: Zinc oxide; organic synthesis.
Railroad shipping regulations: None.*

Zinc Oxide (Chinese white; Zinc white; Flowers of zinc) ZnO.
Color and properties: Amorphous, white powder; absorbs carbon dioxide from the air.
Constants: Sp.gr. 5.78.
Soluble in acids; insoluble in water and alcohol.
Derivation: (a) By distillation of zinc or zinc ore mixed with coke in fire-clay retorts, passing the fumes into a flue through which air is drawn. The hot zinc fumes ignite and burn to the oxide which is collected in bags. (b) By heating zinc carbonate.
Impurities: Zinc carbonate.
Grades: Technical; C. P.; U.S.P.
Containers: Wooden kegs; glass bottles.
Uses: Paint pigment; zinc salts; compounding ingredient in rubber manufacture; ceramic glazes; matches; linoleum (pigment); dental cements; pharmaceutical (ointments and dusting powder for skin diseases); cosmetics; zinc soaps; opaque glass; white printing inks; candles; celluloid; textile printing (resist); white glue and gelatin.
Railroad shipping regulations: None.*

Zinc Oxide, Red. See Zincite.

Zinc Perborate. Probably $ZnBO_3.xH_2O$.
Color and properties: Amorphous, white powder.
Insoluble in water.
Derivation: By the action of boric acid on zinc hydroxide.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Permanganate $Zn(MnO_4)_2.2H_2O$.
Color and properties: Violet-brown or black, hygroscopic crystals.
Soluble in water and acids; decomposes in alcohol.
Derivation: By roasting zinc carbonate and zinc nitrate with manganese dioxide.
Method of purification: Recrystallization.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Medicine; oxidizing agent.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Zinc Peroxide ZnO_2.
Color and properties: White powder.
Decomposes in acids; insoluble in water.
Derivation: By the action of barium peroxide on zinc sulfate solution, followed by filtration.
Impurities: Zinc oxide.
Grades: Technical.
Containers: Tins; iron drums; glass bottles.
Uses: Medicine (antiseptic); cosmetic creams.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label(?)

Zinc Phenate (Zinc carbolate; Zinc phenolate) $Zn(C_6H_5O)_2$.
Color and properties: White powder.
Soluble in alcohol; slightly soluble in water.
Derivation: By heating zinc hydroxide with phenol and extracting with alcohol.
Method of purification: Recrystallization.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Phenolate. See Zinc phenate.

Zinc Phenolsulfonate (Zinc sulfophenate; Zinc sulfocarbolate) $Zn(C_6H_5SO_4)_2.8H_2O$.
Color and properties: Clear, colorless, crystals or fine white powder.
Soluble in water and alcohol.
Derivation: By heating zinc hydroxide with phenol sulfate.
Method of purification: Crystallization.
Impurities: Ortho-compound.
Grades: Technical; U.S.P.
Containers: Tins; glass bottles.
Uses: Medicine (antiseptic and astringent).
Railroad shipping regulations: None.*

Zinc Phosphate (Zinc ortho-phosphate; Zinc phosphate, tribasic) $Zn_3(PO_4)_2.4H_2O$.
Color and properties: White powder.
Constants: Sp.gr. 2.76 to 2.85.
Soluble in acids and ammonium hydroxide; insoluble in water.
Derivation: By the interaction of zinc sulfate and trisodium phosphate.
Grades: Technical.
Containers: Boxes; wooden kegs; glass bottles.
Uses: Medicine; dental cements.
Railroad shipping regulations: None.*

Zinc Phosphate, Tribasic. See Zinc phosphate.

Zinc Phosphide Zn_3P_2.
Color and properties: Dark gray, gritty powder.
Constants: Sp.gr. 4.55.
Soluble in dilute acids; insoluble in water.
Derivation: By passing phosphine into a solution of zinc sulfate.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Phosphite $ZnHPO_3.2\frac{1}{2}H_2O$.
Color and properties: Granular, crystalline powder.
Soluble in cold water; insoluble in hot water.
Derivation; By the action of hypophosphorous acid on zinc hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Picrate (Zinc picronitrate) $Zn[C_6H_2(NO_2)_3O]_2.8H_2O$.
Color and properties: Yellow, crystalline powder, explosive.
Soluble in water.
Derivation: By the action of picric acid on a solution of a zinc salt.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Medicine.
Fire hazard: Dangerous.*
Railroad shipping regulations: Explosive regulations.

Zinc Picronitrate. See Zinc picrate.

Zinc Plating. The application of electrodeposition for the production of zinc coatings is of a very considerable commercial importance. According to Rawdon ("Protective Metallic Coatings," New York, Chemical Catalog Company, Inc., 1928), "on account of its exceptionally high overvoltage, zinc can readily be deposited electrolytically from aqueous solutions usually with high current efficiency, although its position in the electrochemical series would suggest otherwise. As a rule, the process is used for coating finished articles rather than for semi-finished materials such as sheet, wire, and pipe, although very considerable quantities of wire products are coated in this way. Zinc plating is used practically exclusively for coating iron-wire screen cloth. Only very limited quantities of ordinary wire are coated by electroplating, but for flat wire and steel strip, hot-dipping followed by 'wiping' is so much more expensive than electroplating that the latter process is used. It is also used somewhat for pipe, particularly for electrical conduits for interior use. The application of electroplating for sheets is very limited, however. A special application of zinc plating for coating pipe couplings for the particular purpose of preventing 'galling' of the threads is now being extensively used.

"Mechanical devices and automatic equipment for zinc electroplating have been developed to a very high degree of efficiency so that very little attention is required for their operation. The equipment varies according to the materials to be coated, but most of it is of one or the other of two general types, which may be designated as the 'barrel' type and the 'conveyor' type.

"For zinc plating small articles, such as bolts, nuts, screws, nails, washers, and in fact, all small articles which do not need to be handled individually in the plating bath, the barrel method, or a modification of it, is used. A perforated barrel made of some nonconducting material is immersed in the solution of the zinc salts, the electrolyte, and enough of the articles, properly cleaned, to fill the barrel partially, are placed within. They are in contact with flexible metal conductors on the inside of the barrel and together they form the cathode of the cell. The anodes, of cast zinc, are hung in the solution just outside the barrel and sometimes partially encircle it. The barrel is supported in the solution usually with its longitudinal axis horizontal and in a manner such that it can be rotated about this axis. As the plating process proceeds the barrel is slowly rotated so that the articles are 'rumbled' over one another and expose a new surface to the plating current, thus ensuring a uniform coating on all surfaces. In the conveyor type of equipment, the articles are moved through the plating solution past the anodes by means of an endless screw or a chain conveyor on which they are hung. The conveyor with the suspended articles upon it constitutes the cathode. Usually in this method the articles after having been attached to the conveyor are carried in turn through the preliminary cleaning and washing tanks, the plating tank and the final washing baths so that no handling of the articles is necessary except to place them on and remove them from the conveyor.

"For coating wire and wire products such as wire screen cloth, the process is also a continuous one. The wire passes in turn through the pickling and washing tanks, the plating bath and then through the final washing tank. As many as thirty wires, each from a separate reel, are passed through the bath simultaneously and in order to permit the wire to be pulled through at a relatively rapid rate the plating tank must be made very long. Tanks as long as 150 feet are used. Wire screen cloth is coated in an entirely analogous manner although it is often found advantageous to pass the screen up and down over a series of rollers in order to permit the use of smaller plating tanks. In all the above cases, for any given set of plating conditions the thickness of the coating is determined by the length of time the articles are in the plating bath.

"The solutions commonly used in zinc plating are either a slightly acidified zinc sulfate or an alkaline cyanide solution. Addition agents of various kinds are often used for producing fine-grained smooth deposits; in fact more care should be exercised in the choice of addition agents than is generally supposed. It has been shown that organic colloidal substances such as glue or gelatin do not improve the character of deposits made from the commonly used acid sulfate or chloride baths. The cyanide bath has decided advantages over the sulfate especially in its throwing power and is therefore preferred for plating threaded or machined articles or those having an irregular shape or rather deeply recessed parts. The deposit obtained from the cyanide bath is quite uniformly distributed over the surface of the plated article even though the surface to be covered is rather irregular in contour. For the large mill installations, as for wire and wire products, the sulfate bath is used practically exclusively.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

"An electroplated zinc coating is essentially pure zinc and, unlike coatings made by hot-dipping or by cementation, contains no layers of alloyed iron. Schwartz ['Electrolytic zinc,' Z. Elektrochem., 29:198 (1922)] has reported the average composition of such coatings to be 99.85 to 99.90% zinc with traces of copper, lead and iron together with some inclusions, the nature of which depends on the addition agents in the plating bath. The metallic impurities will, of course, vary principally according to the composition of the anodes used. Hydrogen, to the extent of 0.055%, was reported by Schwartz in freshly deposited coatings but was driven off by heating at 105° to 110°C.

"Electroplated coatings will withstand severe bending or other mechanical deformation very much better than other types of zinc coatings of the same thickness. According to results of some adherence tests by Burgess ['Investigation of the properties of zinc coatings,' Electrochem. Metal Ind., 3:17 (1905)] in which the force required to separate the coating from the base metal by means of a brass disc soldered to the surface was measured, the adherence of electroplated coatings was found to be nearly twice as great as for zinc coatings made by the dipping process. The superior mechanical properties of zinc-plated coatings are, however, more properly to be attributed to the absence of the alloy layers than to greater adherence to the base metal. One interesting application of the superior mechanical properties of electroplated zinc coatings is the use of zinc-plated rivets for the fabrication of metal culverts and similar constructions. Even after the riveting operation, enough of the coating adheres to the head of the rivet so as to afford considerable protection against corrosion in service later."

Zinc Powder. Finely divided metallic zinc. See Zinc.

Zinc Pyrophosphate $Zn_2P_2O_7$.
Color and properties: White powder.
Soluble in acids and alkalis; insoluble in water.
Derivation: By heating a soluble zinc salt with ammonium phosphate.
Grades: Technical.
Containers: Wooden kegs.
Uses: Pigment.
Railroad shipping regulations: None.*

Zinc Rhodanide. See Zinc sulfocyanate.

Zinc Salicylate $Zn(C_6H_4COO)_2.3H_2O$.
Color and properties: White, crystalline needles.
Soluble in water and alcohol.
Derivation: By heating zinc hydroxide and salicylic acid.
Method of purification: Crystallization.
Grades: Technical.
Containers: Tins; glass bottles.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Stearate $Zn(C_{18}H_{35}O_2)_2$.
Color and properties: White, agglutinating powder.
Soluble in acids; insoluble in water, alcohol and ether.
Derivation: By the action of sodium stearate on a solution of zinc sulfate.
Grades: Technical; U.S.P.
Containers: Tins; wooden kegs; glass bottles.
Uses: Medicine (skin diseases, infant powder); linoleum (drier); paint (drier); face powders.
Railroad shipping regulations: None.*

Zinc Subcarbonate. See Zinc carbonate, precipitated.

Zinc Subgallate (Zinc gallate). A mixture of 44% zinc oxide and 56% gallic acid.
Color and properties: Greenish-gray, neutral, odorless powder.
Insoluble in water, alcohol and ether.
Grades: Technical.
Containers: Glass bottles; tins.
Uses: Medicine.
Railroad shipping regulations: None.*

Zinc Sulfanilate. See Nizin.

Zinc Sulfate (White vitriol; White copperas; Zinc vitriol) $ZnSO_4.7H_2O$. See also Goslarite.
Color and properties: Colorless crystals; efflorescent in air. Keep well stoppered.
Constants: Sp.gr. 1.9661; m.p. 50°C.
Soluble in water; insoluble in alcohol.
Derivation: (1) By roasting zinc blend in a reverberatory furnace and lixiviating, with subsequent purification. By the action of sulfuric acid on zinc or zinc oxide.
Method of purification: Crystallization.
Grades: Technical; C.P.; U.S.P.
Containers: Glass bottles; barrels.
Uses: Medicine (internally as an emetic, externally as an astringent, mild caustic or disinfectant); mordant in calico printing; preserving wood and skins; manufacture of lithopone; zinc salts; ceramics; paints (pigment, making drying oils); zinc plating (electrolyte); glue and gelatin (preservative, clarifying agents); disinfectant; water purification.
Railroad shipping regulations: None.*

Zinc Sulfide $ZnS.H_2O$.
Color and properties: Yellowish, white powder.
Constants: Sp.gr. 3.98; m.p. 1,049°C.; b.p.: Sublimes at 1,180°C.
Soluble in acids; insoluble in water.
Derivation: By passing hydrogen sulfide gas into a solution of a zinc salt.
Grades: Technical; C.P.
Containers: 1 lb. bottles; wooden barrels.
Uses: Pigment (paint, linoleum, artificial leather); white and opaque glass; white opaque glues and gelatins; base for color lakes; rubber; plastics; dyeing (hydrosulfite process).
Railroad shipping regulations: None.*

Zinc Sulfite $ZnSO_3.2H_2O$.
Color and properties: White, crystalline powder; absorbs oxygen from the air.
Soluble in sulfurous acid; insoluble in cold water and alcohol; decomposes in hot water.
Derivation: By the action of sulfurous acid on zinc hydroxide.
Method of purification: Crystallization.
Impurities: Zinc sulfate.
Grades: Technical; C.P.
Containers: Glass bottles; tins.
Uses: Medicine; preservative for anatomical specimens.
Railroad shipping regulations: None.*

Zinc Sulfocarbolate. See Zinc phenolsulfonate.

Zinc Sulfocyanate (Zinc rhodanide; Zinc sulfocyanide) $Zn(CNS)_2$.
Color and properties: White powder.
Soluble in water, alcohol and ammonium hydroxide.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

Derivation: By the interaction of zinc hydroxide and ammonium sulfocyanate.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Zinc Sulfocyanide. See Zinc sulfocyanate.

Zinc Sulfophenate. See Zinc phenolsulfonate.

Zinc-tin Amalgam.
Composed of zinc 25%, tin 25%, mercury 50%.
Grades: Technical.
Containers: Glass bottles.
Uses: Electrical machines; dental cement.
Railroad shipping regulations: None.*

Zinc Valeriate. See Zinc valerianate.

Zinc Valerianate (Zinc valeriate) $Zn(C_5H_9O_2)_2.2H_2O$.
Color and properties: White, pearly crystals or powder with disagreeable odor.
Soluble in hot water and alcohol, very slightly soluble in ether.
Derivation: Interaction of zinc sulfate and sodium isovalerianate or zinc carbonate and isovalerianic acid.
Grades: U.S.P.
Containers: 1 lb. bottles.
Uses: Medicine (of doubtful value).

Zinc Vitriol. See Zinc sulfate; also Goslarite.

Zinc White. See Zinc oxide.

Zincite (Zinc oxide, red; Red zinc ore) ZnO, with usually some Mn or Fe.
Deep-red to brick-red adamantine mineral, subadamantine luster. Differs from realgar (q.v.) and cinnabar (q.v.) in its associates, infusibility and slow volatilization. Contains 80.3% zinc.
Soluble in hydrochloric acid.
Constants: Sp.gr. 5.4 to 5.7; hardness 4 to 4.5.
Occurrence: United States (New Jersey), Germany, Italy, Poland.

Zingiber. See Ginger.

Zinkenite $PbS.Sb_2S_3$.
Steel-gray secondary mineral formed in lead and antimony veins.
Constants: Sp.gr. 5.3 to 6.5; hardness 2.5 to 3.5.
Occurrence: United States (Arkansas).

Zinnwaldite. See Mica.

Zinox. A trade name for a pigment mostly made and used in France. It is a hydrated oxide of zinc. It is claimed that it possesses a slight advantage over zinc oxide in that it remains in suspension longer than any other pigment.

Zircon $ZrSiO_4$.
A natural zirconium silicate. Color, light yellow, brownish-yellow, gray, yellowish-green, reddish-brown. Adamantine luster. Contains 67.2% zirconia and 32.8% silica.
Insoluble in acids.
Constants: Sp.gr. 4.68 to 4.70; hardness 7.5.
Varieties:
Hyacinth. Brownish-yellow and red.
Jargon. Yellow, green.
Matura diamonds. The color can be changed by heating and the brownish-yellow stones can be completely decolorized when so treated. These are known as "Matura Diamonds."
Occurrence: United States (Maine, New York, Pennsylvania, North Carolina, Colorado, California), Canada, Ceylon, Siam, Russia, Norway, Austria, Germany, Madagascar, Brazil.
Uses: Source of zirconium oxide; Matura diamonds; when clear and orange colored, is also used for the gem stone known as hyacinth.

Zirconia. See Zirconium oxide.

Zirconic Anhydride. See Zirconium oxide.

Zirconium Zr.
Color and properties: Hard, lustrous, grayish, crystalline scales.
Constants: Sp.gr. 4.15 to 6.40; m.p. 1,500° to 2,350°C.
Soluble in hot acids; insoluble in water and cold acids.
Derivation: By the reduction of the oxide.
Grades: Technical.
Containers: Glass bottles; wooden kegs.
Uses: Zirconium compounds.
Railroad shipping regulations: None.*

Zirconium Acetate, Basic $Zr(C_2H_3O_2)_3OH$.
Color and properties: White crystals.
Soluble in water.
Derivation: By the action of acetic acid on zirconium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Weighting silk.
Railroad shipping regulations: None.*

Zirconium Carbide ZrC_2.
Soluble in acids; decomposes in water.
Derivation: By heating zirconium oxide and coke in an electric furnace.
Grades: Technical.
Containers: Iron drums.
Uses: Incandescent filaments; abrasive.
Railroad shipping regulations: None.*

Zirconium Carbonate, Basic $3ZrO_2CO_2.6H_2O$.
Color and properties: White, amorphous powder.
Soluble in acids; insoluble in water.
Derivation: By adding sodium carbonate to a solution of zirconium salt.
Grades: Technical.
Containers: Glass bottles; wooden kegs.
Uses: Zirconium oxide.
Railroad shipping regulations: None.*

Zirconium Chloride (Zirconium tetrachloride) $ZrCl_4$.
Color and properties: White, lustrous crystals.
Constants: B.p. 400°C.
Soluble in alcohol; decomposes in water.
Derivation: By the action of hydrochloric acid on zirconium hydroxide.
Grades: Technical.
Containers: Glass bottles.
Uses: Analytical chemistry.
Railroad shipping regulations: None.*

Zirconium Chloride, Basic. See Zirconium oxychloride.

Zirconium Ferro Alloys. Alloys used in the manufacture of steel.

Zirconium-ferro-silicon:

Approximate analysis:	Per Cent
Zirconium	9 to 12
Silicon	40 to 47
Iron	40 to 45

Application: Steel of high silicon content.

Silicon-zirconium:

Approximate analysis:	Per Cent
Zirconium	35 to 40
Silicon	47 to 52
Iron	6 to 10

Application: Steel of low silicon content.

Uses: Zirconium is used as a deoxidizer and scavenger of steel in amounts between 0.05 and 0.10%. It acts first on the oxygen and nitrogen in the steel, tending to eliminate them as well as non-metallic inclusions. In amounts of 0.10 to 0.15%, it forms zirconium nitride. When present in steel above 0.15%, it combines with sulfur, forming zirconium sulfide. This prevents tearing in rolling and produces a better surface on high-sulfur steel.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

See also zirconium steels under Iron and steel (Ferrum).

Zirconium Hydroxide $Zr(OH)_4$.
Color and properties: White, bulky, amorphous powder.
Constants: Sp.gr. 3.25; m.p.: Loses $2H_2O$ at 550°C.
Soluble in dilute mineral acids; insoluble in water and alkalis.
Derivation: By the action of a solution of sodium hydroxide on a solution of a zirconium salt.
Grades: Technical.
Containers: Wooden kegs; glass bottles.
Uses: Zirconium compounds.
Railroad shipping regulations: None.*

Zirconium Nitrate $Zi(NO_3)_4.5H_2O$.
Color and properties: White crystals.
Constants: M.p.: Decomposes at 100°C.
Soluble in water.
Derivation: By the action of nitric acid on zirconium oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Wooden kegs.
Uses: Food preservative.
Fire hazard: Dangerous.*
Railroad shipping regulations: Yellow label.

Zirconium Ortho-phosphate. See Zirconium phosphate.

Zirconium Oxide (Zirconia; Zirconic anhydride) ZrO_2.
Color and properties: Heavy, white, amorphous powder.
Constants: Sp.gr. 5.0; m.p. 2,500°C.
Soluble in nitric acid; insoluble in water, hydrochloric acid and sulfuric acid.
Derivation: By heating zirconium hydroxide.
Grades: Technical.
Containers: Wooden kegs.
Uses: Incandescent gas mantles; Roentgen ray photography; metallurgy; abrasive; substitute for calcium oxide in calcium lights; ceramics; acid-proof enamel; refractory utensils; refractory cements; opacifier in white glass used in indirect electric lighting.
Railroad shipping regulations: None.*

Zirconium Oxychloride (Zirconium chloride, basic; Zirconyl chloride) $ZrOCl_2.8H_2O$.
Color and properties: White, silky crystals.
Soluble in water and alcohol.
Derivation: By the action of hydrochloric acid on zirconium oxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical reagent.
Railroad shipping regulations: None.*

Zirconium Phosphate (Zirconium phosphate, basic; Zirconium ortho-phosphate) $5ZrO_2(P_2O_5)_4.8H_2O$.
Color and properties: White, dense, amorphous powder.
Soluble in acids; insoluble in water.
Derivation: By the action of ortho-phosphoric acid on zirconium hydroxide.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical reagent.
Railroad shipping regulations: None.*

Zirconium Phosphate, Basic. See Zirconium phosphate.

Zirconium Sulfate $Zr(SO_4)_2.4H_2O$.
Color and properties: White, crystalline powder.
Soluble in water; insoluble in alcohol.
Derivation: By the action of sulfuric acid on zirconium hydroxide.
Method of purification: Crystallization.
Grades: Technical.
Containers: Glass bottles.
Uses: Chemical reagent.
Railroad shipping regulations: None.*

Zirconium Tetrachloride. See Zirconium chloride.

Zirconyl Chloride. See Zirconium oxychloride.

Zoisite (Thulite) $Ca_2(AlOH)Al_2(SiO_4)_3$.
One of the epidote (q.v.) group of minerals. Color, grayish-white, gray, peach-blossom to rose-red, green; white or uncolored streak; vitreous or pearly luster.
Constants: Sp.gr. 3.25 to 3.37; hardness 6 to 6.5.
Occurrence: United States (Tennessee, Massachusetts, Pennsylvania), Austria, Switzerland, Norway, Italy.
Uses: Ornamental stone.

Zonite. A sodium hypochlorite solution stated to be equivalent to 0.9% available chlorine.
Railroad shipping regulations: None.*

Zorite. A ferrous alloy containing 35% nickel, 17% iron, 15% chromium, 1.75% manganese, 0.5% carbon.

Zylonite. See Celluloid.

Zymase. See Invertin.

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* *See paragraph 2, page 16 to paragraph 2, page 17 inclusive.*

APPENDIX

ACKNOWLEDGMENT

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Chemical Rubber Publishing Co., Cleveland, Ohio, "Handbook of Chemistry and Physics."

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U. S. Industrial Alcohol Co., New York, N. Y., "Alcohol for Industrial Purposes."

D. Van Nostrand Co., Inc., "Van Nostrand's Chemical Annual."

The tables which appeared in the first edition of the Dictionary are also to be found in the revised edition.

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American Chemical Society
Atomic Weights
1929

	Symbol	At. Number	At. Weight
Aluminum	Al	13	26.97
Antimony	Sb	51	121.77
Argon	A	18	39.94
Arsenic	As	33	74.96
Barium	Ba	56	137.36
Beryllium	Be	4	9.02
Bismuth	Bi	83	209.00
Boron	B	5	10.82
Bromine	Br	35	79.916
Cadmium	Cd	48	112.41
Calcium	Ca	20	40.07
Carbon	C	6	12.000
Cerium	Ce	58	140.13
Cesium	Cs	55	132.81
Chlorine	Cl	17	35.457
Chromium	Cr	24	52.01
Cobalt	Co	27	58.94
Columbium	Cb	41	93.1
Copper	Cu	29	63.57
Dysprosium	Dy	66	162.46
Erbium	Er	68	167.64
Europium	Eu	63	152.0
Fluorine	F	9	19.00
Gadolinium	Gd	64	157.26
Gallium	Ga	31	69.72
Germanium	Ge	32	72.60
Gold	Au	79	197.2
Hafnium	Hf	72	178.6
Helium	He	2	4.002
Holmium	Ho	67	163.5
Hydrogen	H	1	1.0078
Indium	In	49	114.8
Iodine	I	53	126.932
Iridium	Ir	77	193.1
Iron	Fe	26	55.84
Krypton	Kr	36	82.9
Lanthanum	La	57	138.90
Lead	Pb	82	207.22
Lithium	Li	3	6.940
Lutecium	Lu	71	175.0
Magnesium	Mg	12	24.32
Manganese	Mn	25	54.93
Mercury	Hg	80	200.61
Molybdenum	Mo	42	96.0
Neodymium	Nd	60	144.27
Neon	Ne	10	20.183
Nickel	Ni	28	58.69
Nitrogen	N	7	14.008
Osmium	Os	76	190.8
Oxygen	O	8	16.0000
Palladium	Pd	46	106.7
Phosphorus	P	15	31.02
Platinum	Pt	78	195.23
Potassium	K	19	39.10
Praseodymium	Pr	59	140.92
Radium	Ra	88	225.97
Radon	Rn	86	222
Rhenium	Re	75	188.7
Rhodium	Rh	45	102.91
Rubidium	Rb	37	85.44
Ruthenium	Ru	44	101.7
Samarium	Sm	62	150.43
Scandium	Sc	21	45.10
Selenium	Se	34	79.2
Silicon	Si	14	28.06
Silver	Ag	47	107.880
Sodium	Na	11	22.997
Strontium	Sr	38	87.63
Sulfur	S	16	32.06
Tantalum	Ta	73	181.5
Tellurium	Te	52	127.5
Terbium	Tb	65	159.2
Thallium	Tl	81	204.39
Thorium	Th	90	232.12
Thulium	Tm	69	169.4
Tin	Sn	50	118.70
Titanium	Ti	22	47.90
Tungsten	W	74	184.0
Uranium	U	92	238.14
Vanadium	V	23	50.96
Xenon	Xe	54	130.2
Ytterbium	Yb	70	173.6
Yttrium	Y	39	88.92
Zinc	Zn	30	65.38
Zirconium	Zr	40	91.22

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Domestic Weights and Measures

Apothecaries' Weight

20 grain	1 scruple
3 scruples	1 dram
8 drams	1 ounce
12 ounces	1 pound

Avoirdupois Weight
(short ton)

$27\frac{11}{32}$ grains	1 dram
16 drams	1 ounce
16 ounces	1 pound
14 pounds	1 stone
25 pounds	1 quarter
4 quarters	1 hundredweight (cwt)
20 hundredweights	1 ton

Avoirdupois Weight
(long ton)

$27\frac{11}{32}$ grains	1 dram
16 drams	1 ounce
16 ounces	1 pound
112 pounds	1 hundredweight
20 hundredweights	1 ton

Circular Measure

60 seconds	1 minute
60 minutes	1 degree
30 degrees	1 sign
12 signs	1 circle or circumference

Cubic Measure

1728 cubic inches	1 cubic foot
27 cubic feet	1 cubic yard

Dry Measure

2 pints	1 quart
8 quarts	1 peck
4 pecks	1 bushel

Liquid Measure

4 gills	1 pint
2 pints	1 quart
4 quarts	1 gallon
$31\frac{1}{2}$ gallons	1 barrel
2 barrels	1 hogshead

Long Measure

12 inches	1 foot
3 feet	1 yard
$5\frac{1}{2}$ yards	1 rod or pole
40 rods	1 furlong
8 furlongs	1 statute mile
5280 feet	1 statute mile
1760 yards	1 statute mile
3 miles	1 league

Mariners' Measure

6 feet	1 fathom
120 fathoms	1 cable length
$7\frac{1}{2}$ cable lengths	1 mile
5280 feet	1 statute mile
6085 feet	1 nautical mile

Paper Measure

24 sheet	1 quire
20 quires	1 short ream
500 sheets	1 long ream
2 reams	1 bundle
5 bundles	1 bale

Square Measure

144 square inches	1 square foot
9 square feet	1 square yard
$30\frac{1}{4}$ square yards	1 square rod or perch
40 square rods	1 rood
4 roods	1 acre
640 acres	1 square mile
36 square miles	1 township

Troy Weight

24 grains	1 pennyweight
20 pennyweights	1 ounce
12 ounces	1 pound

Metric Equivalents

	Approximate		Exact
1 acre	0.40	hectare	0.4047
1 bushel	35.	liters	35.24
1 centimeter	0.39	inch	0.3937
1 cubic centimeter	0.061	cubic inch	0.0610
1 cubic foot	0.028	cubic meter	0.0283
1 cubic inch	16.	cubic centimeters	16.39
1 cubic meter	35.	cubic feet	35.31
1 cubic meter	1.3	cubic yards	1.308
1 cubic yard	0.76	cubic meter	0.7646
1 foot	30.	centimeters	30.48
1 gallon (U. S.)	3.8	liters	3.785
1 gallon (Imperial)	4.5	liters	4.546
1 grain	0.065	gram	0.0648
1 gram	15.	grains	15.43
1 hectare	2.5	acres	2.471
1 inch	25.	millimeters	25.40
1 kiogram (kilo)	2.2	pounds	2.205
1 kilometer	0.62	mile	0.6214
1 liter	0.91	quart (dry)	0.9081
1 liter	1.1	quarts (liquid) (U. S.)	1.057
1 liter	0.88	quart (liquid) (Imperial)	0.8799
1 meter	3.3	feet	3.281
1 mile	1.6	kilometers	1.609
1 millimeter	0.039	inch	0.0394
1 ounce (avoirdupois)	28.	grams	28.35
1 ounce (Troy)	31.	grams	31.10
1 peck	8.8	liters	8.810
1 pint (liquid)	0.47	liter	0.4732
1 pound	0.45	kilogram	0.4536
1 quart (dry)	1.1	liters	1.101
1 quart (liquid)	0.95	liter	0.9463
1 square centimeter	0.15	square inch	0.1550
1 square foot	0.093	square meter	0.0929
1 square inch	6.5	square centimeters	6.452
1 square meter	1.2	square yards	1.196
1 square meter	11.	square feet	10.76
1 square yard	0.84	square meter	0.8361
1 ton (2,000 lbs.)	0.91	metric ton	0.9072
1 ton (2,240 lbs.)	1.	metric ton	1.016
1 ton (metric)	1.1	ton (2,000 lbs.)	1.102
1 ton (metric)	0.98	ton (2,240 lbs.)	0.9842
1 yard	0.91	meter	0.9144

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
–459.4	–273.	–21.	–29.44	17.60	–8.	56.	13.33
–436.	–270.	–20.20	–29.	18.	–7.78	57.	13.89
–418.	–260.	–20.	–28.89	19.	–7.22	57.20	14.
–400	–240.	–19.	–28.33	19.40	–7.	58.	14.44
–382	–230	–18.40	–28.	20.	–6.67	59.	15.
–364.	–220.	–18.	–27.78	21.	–6.11	60.	15.56
–346.	–210.	–17.	–27.22	21.20	–6.	60.80	16.
–328.	–200.	–16.60	–27.	22.	–5.56	61.	16.11
–310.	–190.	–16.	–26.67	23.	–5.	62.	16.67
–292.	–180.	–15.	–26.11	24.	–4.44	62.60	17.
–274.	–170.	–14.80	–26.	24.80	–4	63.	17.22
–256.	–160.	–14.	–25.56	25.	–3.89	64.	17.78
–238.	–150.	–13.	–25.	26.	–3.33	64.40	18.
–220.	–140.	–12.	–24.44	26.60	–3.	65.	18.33
–202.	–130.	–11.20	–24.	27.	–2.78	66.	18.89
–184.	–120.	–11.	–23.89	28.	–2.22	66.20	19.
–166.	–110.	–10.	–23.33	28.40	–2.	67.	19.44
–148.	–100	–9.40	–23.	29.	–1.67	68.	20.
–139.	–95.	–9.	–22.78	30.	–1.11	69.	20.56
–130.	–90.	–8.	–22.22	30.20	–1.	69.80	21.
–121.	–85.	–7.60	–22.	31.	–0.56	70.	21.11
–112.	–80.	–7.	–21.67	32.	0.	71.	21.67
–103.	–75.	–6.	–21.11	33.	+0.56	71.60	22.
–94.	–70	–5.80	–21.	33.80	1.	72.	22.22
–85.	–65.	–5.	–20.56	34.	1.11	73.	22.78
–76.	–60.	–4.	–20.	35.	1.67	73.40	23.
–67.	–55.	–3.	–19.44	35.60	2.	74.	23.33
–58.	–50.	–2.20	–19.	36.	2.22	75.	23.89
–49.	–45.	–2.	–18.89	37.	2.78	75.20	24.
–40.	–40.	–1.	–18.33	37.40	3.	76.	24.44
–39.	–39.44	–0.40	–18.	38.	3.33	77.	25.
–38.20	–39.	0.	–17.78	39.	3.89	78.	25.56
–38.	–38.89	+1.	–17.22	39.20	4.	78.80	26.
–37.	–38.33	1.40	–17.	40.	4.44	79.	26.11
–36.40	–38.	2.	–16.67	41.	5.	80.	26.67
–36.	–37.78	3.	–16.11	42.	5.56	80.60	27.
–35.	–37.22	3.20	–16.	42.80	6.	81.	27.22
–34.60	–37.	4.	–15.56	43.	6.11	82.	27.78
–34.	–36.67	5.	–15.	44.	6.67	82.40	28.
–33.	–36.11	6.	–14.44	44.60	7.	83.	28.33
–32.80	–36.	6.80	–14.	45.	7.22	84.	28.89
–32.	–35.56	7.	–13.89	46.	7.78	84.20	29.
–31.	–35.	8.	–13.33	46.40	8.	85.	29.44
–30.	–34.44	8.60	–13.	47.	8.33	86.	30.
–29.20	–34.	9.	–12.78	48.	8.89	87.	30.56
–29.	–33.89	10.	–12.22	48.20	9.	87.80	31.
–28.	–33.33	10.40	–12.	49.	9.44	88.	31.11
–27.40	–33.	11.	–11.67	50.	10.	89.	31.67
–27.	–32.78	12.	–11.11	51.	10.56	89.60	32.
–26.	–32.22	12.20	–11.	51.80	11.	90.	32.22
–25.60	–32.	13.	–10.56	52.	11.11	91.	32.78
–25.	–31.67	14.	–10.	53.	11.67	91.40	33.
–24.	–31.11	15.	–9.44	53.60	12.	92.	33.33
–23.80	–31.	15.80	–9.	54.	12.22	93.	33.89
–23.	–30.56	16.	–8.89	55.	12.78	93.20	34.
–22.	–30.	17.	–8.33	55.40	13.	94.	34.44

Equivalent Temperature Readings Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
95.	**35.**	**134.**	56.67	172.40	**78.**	**211.**	99.44
96.	35.56	134.60	**57.**	**173.**	78.33	**212.**	**100.**
96.80	**36.**	**135.**	57.22	**174.**	78.89	**213.**	100.56
97.	36.11	**136.**	57.78	174.20	**79.**	213.80	**101.**
98.	36.67	136.40	**58.**	**175.**	79.44	**214.**	101.11
98.60	**37.**	**137.**	58.33	**176.**	**80.**	**215.**	101.67
99.	37.22	**138.**	58.89	**177.**	80.56	215.60	**102.**
100.	37.78	138.20	**59.**	177.80	**81.**	**216.**	102.22
100.40	**38.**	**139.**	59.44	**178.**	81.11	**217.**	102.78
101.	38.33	**140.**	**60.**	**179.**	81.67	217.40	**103.**
102.	38.89	**141.**	60.56	179.60	**82.**	**218.**	103.33
102.20	**39.**	141.80	**61.**	**180.**	82.22	**219.**	103.89
103.	39.44	**142.**	61.11	**181.**	82.78	219.20	**104.**
104.	**40.**	**143.**	61.67	181.40	**83.**	**220.**	104.44
105.	40.56	143.60	**62.**	**182.**	83.33	**221.**	**105.**
105.80	**41.**	**144.**	62.22	**183.**	83.89	**222.**	105.56
106.	41.11	**145.**	62.78	183.20	**84.**	222.80	**106.**
107.	41.67	145.40	**63.**	**184.**	84.44	**223.**	106.11
107.60	**42.**	**146.**	63.33	**185.**	**85.**	**224.**	106.67
108.	42.22	**147.**	63.89	**186.**	85.56	224.60	**107.**
109.	42.78	147.20	**64.**	186.80	**86.**	**225.**	107.22
109.40	**43.**	**148.**	64.44	**187.**	86.11	**226.**	107.78
110.	43.33	**149.**	**65.**	**188.**	86.67	226.40	**108.**
111.	43.89	**150.**	65.56	188.60	**87.**	**227.**	108.33
111.20	**44.**	150.80	**66.**	**189.**	87.22	**228.**	108.89
112.	44.44	**151.**	66.11	**190.**	87.78	228.20	**109.**
113.	**45.**	**152.**	66.67	190.40	**88.**	**229.**	109.44
114.	45.56	152.60	**67.**	**191.**	88.33	**230.**	**110.**
114.80	**46.**	**153.**	67.22	**192.**	88.89	**231.**	110.56
115.	46.11	**154.**	67.78	192.20	**89.**	231.80	**111.**
116.	46.67	154.40	**68.**	**193.**	89.44	**232.**	111.11
116.60	**47.**	**155.**	68.33	**194.**	**90.**	**233.**	111.67
117.	47.22	**156.**	68.89	**195.**	90.56	233.60	**112.**
118.	47.78	156.20	**69.**	195.80	**91.**	**234.**	112.22
118.40	**48.**	**157.**	69.44	**196.**	91.11	**235.**	112.78
119.	48.33	**158.**	**70.**	**197.**	91.67	235.40	**113.**
120.	48.89	**159.**	70.56	197.60	**92.**	**236.**	113.33
120.20	**49.**	159.80	**71.**	**198.**	92.22	**237.**	113.89
121.	49.44	**160.**	71.11	**199.**	92.78	237.20	**114.**
122.	**50.**	**161.**	71.67	199.40	**93.**	**238.**	114.44
123.	50.56	161.60	**72.**	**200.**	93.33	**239.**	**115.**
123.80	**51.**	**162.**	72.22	**201.**	93.89	**240.**	115.56
124.	51.11	**163.**	72.78	201.20	**94.**	240.80	**116.**
125.	51.67	163.40	**73.**	**202.**	94.44	**241.**	116.11
125.60	**52.**	**164.**	73.33	**203.**	**95.**	**242.**	116.67
126.	52.22	**165.**	73.89	**204.**	95.56	242.60	**117.**
127.	52.78	165.20	**74.**	204.80	**96.**	**243.**	117.22
127.40	**53.**	**166.**	74.44	**205.**	96.11	**244.**	117.78
128.	53.33	**167.**	**75.**	**206.**	96.67	244.40	**118.**
129.	53.89	**168.**	75.56	206.60	**97.**	**245.**	118.33
129.20	**54.**	168.80	**76.**	**207.**	97.22	**246.**	118.89
130.	54.44	**169.**	76.11	**208.**	97.78	246.20	**119.**
131.	**55.**	**170.**	76.67	208.40	**98.**	**247.**	119.44
132.	55.56	170.60	**77.**	**209.**	98.33	**248.**	**120.**
132.80	**56.**	**171.**	77.22	**210.**	98.89	**249.**	120.56
133.	56.11	**172.**	77.78	210.20	**99.**	249.80	**121.**

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
250.	121.11	289.	142.78	327.20	164.	366.80	186.
251.	121.67	289.40	143.	328.	164.44	367.	186.11
251.60	122.	290.	143.33	329.	165.	368.	186.67
252.	122.22	291.	143.89	330.	165.56	368.60	187.
253.	122.78	291.20	144.	330.80	166.	369.	187.22
253.40	123.	292.	144.44	331.	166.11	370.	187.78
254.	123.33	293.	145.	332.	166.67	370.40	188.
255.	123.89	294.	145.56	332.60	167.	371.	188.33
255.20	124.	294.80	146.	333.	167.22	372.	188.89
256.	124.44	295.	146.11	334.	167.78	372.20	189.
257.	125.	296.	146.67	334.40	168.	373.	189.44
258.	125.56	296.60	147.	335.	168.33	374.	190.
258.80	126.	297.	147.22	336.	168.89	375.	190.56
259.	126.11	298.	147.78	336.20	169.	375.80	191.
260.	126.67	298.40	148.	337.	169.44	376.	191.11
260.60	127.	299.	148.33	338.	170.	377.	191.67
261.	127.22	300.	148.89	339.	170.56	377.60	192.
262.	127.78	300.20	149.	339.80	171.	378.	192.22
262.40	128.	301.	149.44	340.	171.11	379.	192.78
263.	128.33	302.	150.	341.	171.67	379.40	193.
264.	128.89	303.	150.56	341.60	172.	380.	193.33
264.20	129.	303.80	151.	342.	172.22	381.	193.89
265.	129.44	304.	151.11	343.	172.78	381.20	194.
266.	130.	305.	151.67	343.40	173.	382	194.44
267.	130.56	305.60	152.	344.	173.33	383.	195.
267.80	131.	306.	152.22	345.	173.89	384.	195.56
268.	131.11	307.	152.78	345.20	174.	384.80	196.
269.	131.67	307.40	153.	346.	174.44	385.	196.11
269.60	132.	308.	153.33	347.	175.	386.	196.67
270.	132.22	309.	153.89	348.	175.56	386.60	197.
271.	132.78	309.20	154.	348.80	176.	387.	197.22
271.40	133.	310.	154.44	349.	176.11	388.	197.78
272.	133.33	311.	155.	350.	176.67	388.40	198.
273.	133.89	312.	155.56	350.60	177.	389.	198.33
273.20	134.	312.80	156.	351.	177.22	390.	198.89
274.	134.44	313.	156.11	352.	177.78	390.20	199.
275.	135.	314.	156.67	352.40	178.	391.	199.44
276.	135.56	314.60	157.	353.	178.33	392.	200.
276.80	136.	315.	157.22	354.	178.89	393.	200.56
277.	136.11	316.	157.78	354.20	179.	393.80	201.
278.	136.67	316.40	158.	355.	179.44	394.	201.11
278.60	137.	317.	158.33	356.	180.	395.	201.67
279.	137.22	318.	158.89	357.	180.56	395.60	202.
280.	137.78	318.20	159.	357.80	181.	396.	202.22
280.40	138.	319.	159.44	358.	181.11	397.	202.78
281.	138.33	320.	160.	359.	181.67	397.40	203.
282.	138.89	321.	160.56	359.60	182.	398.	203.33
282.20	139.	321.80	161.	360.	182.22	399.	203.89
283.	139.44	322.	161.11	361.	182.78	399.20	204.
284.	140.	323.	161.67	361.40	183.	400.	204.44
285.	140.56	323.60	162.	362.	183.33	401.	205.
285.80	141.	324.	162.22	363.	183.89	402.	205.56
286.	141.11	325.	162.78	363.20	184.	402.80	206.
287.	141.67	325.40	163.	364.	184.44	403.	206.11
287.60	142.	326.	163.33	365.	185.	404.	206.67
288.	142.22	327.	163.89	366.	185.56	404.60	207.

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
405.	207.22	444.	228.89	483.	250.56	521.60	272.
406.	207.78	444.20	229.	483.80	251.	522.	272.22
406.40	208.	445.	229.44	484.	251.11	523.	272.78
407.	208.33	446.	230.	485.	251.67	523.40	273.
408.	208.89	447.	230.56	485.60	252.	524.	273.33
408.20	209.	447.80	231.	486.	252.22	525.	273.80
409.	209.44	448.	231.11	487.	252.78	525.20	274.
410.	210.	449.	231.67	487.40	253.	526.	274.44
411.	210.56	449.60	232.	488.	253.33	527.	275.
411.80	211.	450.	232.22	489.	253.89	528.	275.56
412.	211.11	451.	232.78	489.20	254.	528.80	276.
413.	211.67	451.40	233.	490.	254.44	529.	276.11
413.60	212.	452.	233.33	491.	255.	530.	276.67
414.	212.22	453.	233.89	492.	255.56	530.60	277.
415.	212.78	453.20	234.	492.80	256.	531.	277.22
415.40	213.	454.	234.44	493.	256.11	532.	277.78
416.	213.33	455.	235.	494.	256.67	532.40	278.
417.	213.89	456.	235.56	494.60	257.	533.	278.33
417.20	214.	456.80	236.	495.	257.22	534.	278.89
418.	214.44	457.	236.11	496.	257.78	534.20	279.
419.	215.	458.	236.67	496.40	258.	535.	279.44
420.	215.56	458.60	237.	497.	258.33	536.	280.
420.80	216.	459.	237.22	498.	258.89	537.	280.56
421.	216.11	460.	237.78	498.20	259.	537.80	281.
422.	216.67	460.40	238.	499.	259.44	538.	281.11
422.60	217.	461.	238.33	500.	260.	539.	281.67
423.	217.22	462.	238.89	501.	260.56	539.60	282.
424.	217.78	462.20	239.	501.80	261.	540.	282.22
424.40	218.	463.	239.44	502.	261.11	541.	282.78
425.	218.33	464.	240.	503.	261.67	541.40	283.
426.	218.89	465.	240.56	503.60	262.	542.	283.33
426.20	219.	465.80	241.	504.	262.22	543.	283.89
427.	219.44	466.	241.11	505.	262.78	543.20	284.
428.	220.	467.	241.67	505.40	263.	544.	284.44
429.	220.56	467.60	242.	506.	263.33	545.	285.
429.80	221.	468.	242.22	507.	263.89	546.	285.56
430.	221.11	469.	242.78	507.20	264.	546.80	286.
431.	221.67	469.40	243.	508.	264.44	547.	286.11
431.60	222.	470.	243.33	509.	265.	548.	286.67
432.	222.22	471.	243.89	510.	265.56	548.60	287.
433.	222.78	471.20	244.	510.80	266.	549.	287.22
433.40	223.	472.	244.44	511.	266.11	550.	287.78
434.	223.33	473.	245.	512.	266.67	550.40	288.
435.	223.89	474.	245.56	512.60	267.	551.	288.33
435.20	224.	474.80	246.	513.	267.22	552.	288.89
436.	224.44	475.	246.11	514.	267.78	552.20	289.
437.	225.	476.	246.67	514.40	268.	553.	289.44
438.	225.56	476.60	247.	515.	268.33	554.	290.
438.80	226.	477.	247.22	516.	268.89	555.	290.56
439.	226.11	478.	247.78	516.20	269.	555.80	291.
440.	226.67	478.40	248.	517.	269.44	556.	291.11
440.60	227.	479.	248.33	518.	270.	557.	291.67
441.	227.22	480.	248.89	519.	270.56	557.60	292.
442.	227.78	480.20	249.	519.80	271.	558.	292.22
442.40	228.	481.	249.44	520.	271.11	559.	292.78
443.	228.33	482.	250.	521.	271.67	559.40	293.

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
560.	293.33	599.	315.	638.	336.67	676.40	358.
561.	293.89	600.	315.56	638.60	337.	677.	358.33
561.20	294.	600.80	316.	639.	337.22	678.	358.89
562.	294.44	601.	316.11	640.	337.78	678.20	359.
563.	295.	602.	316.67	640.40	338.	679.	359.44
564.	295.56	602.60	317.	741.	338.33	680.	360.
564.80	296.	603.	317.22	642.	338.89	681.	360.56
565.	296.11	604.	317.78	642.20	339.	681.80	361.
566.	296.67	604.40	318.	643.	339.44	682.	361.11
566.60	297.	605.	318.33	644.	340.	683.	361.67
567.	297.22	606.	318.89	645.	340.56	683.60	362.
568.	297.78	606.20	319.	645.80	341.	684.	362.22
568.40	298.	607.	319.44	646.	341.11	685.	362.78
569.	298.33	608.	320.	647.	341.67	685.40	363.
570.	298.89	609.	320.56	647.60	342.	686.	363.33
570.20	299.	609.80	321.	648.	342.22	687.	363.89
571.	299.44	610.	321.11	649.	342.78	687.20	364.
572.	300.	611.	321.67	649.40	343.	688.	364.44
573.	300.56	611.60	322.	650.	343.33	689.	365.
573.80	301.	612.	322.33	651.	343.89	690.	365.56
574.	301.11	613.	322.70	651.20	344.	690.80	366.
575.	301.67	613.40	323.	652.	344.44	691.	366.11
575.60	302.	614.	323.33	653.	345.	692.	366.67
576.	302.22	615.	323.89	654.	345.56	692.60	367.
577.	302.78	615.20	324.	654.80	346.	693.	367.22
577.40	303.	616.	324.44	655.	346.11	694.	367.78
578.	303.33	617.	325.	656.	346.67	694.40	368.
579.	303.89	618.	325.56	656.60	347.	695.	368.33
579.20	304.	618.80	326.	657.	347.22	696.	368.89
580.	304.44	619.	326.11	658.	347.78	696.20	369.
581.	305.	620.	326.67	658.40	348.	697.	369.44
582.	305.56	620.60	327.	659.	348.33	698.	370.
582.80	306.	621.	327.22	660.	348.89	699.	370.56
583.	306.11	622.	327.78	660.20	349.	699.80	371.
584.	306.67	622.40	328.	661.	349.44	700.	371.11
584.60	307.	623.	328.33	662.	350.	701.	371.67
585.	307.22	624.	328.89	663.	350.56	701.60	372.
586.	307.78	624.20	329.	663.80	351.	702.	372.22
586.40	308.	625.	329.44	664.	351.11	703.	372.78
587.	308.33	626.	330.	665.	351.67	703.40	373.
588.	308.89	627.	330.56	665.60	352.	704.	373.33
588.20	309.	627.80	331.	666.	352.22	705.	373.89
589.	309.44	628.	331.11	667.	352.78	705.20	374.
590.	310.	629.	331.67	667.40	353.	706.	374.44
591.	310.56	629.60	332.	668.	353.33	707.	375.
591.80	311.	630.	332.22	669.	353.89	708.	375.56
592.	311.11	631.	332.78	669.20	354.	708.80	376.
593.	311.67	631.40	333.	670.	354.44	709.	376.11
593.60	312.	632.	333.33	671.	355.	710.	376.67
594.	312.22	633.	333.89	672.	355.56	710.60	377.
595.	312.78	633.20	334.	672.80	356.	711.	377.22
595.40	313.	634.	334.44	673.	356.11	712.	377.78
596.	313.33	635.	335.	674.	356.67	712.40	378.
597.	313.89	636.	335.56	674.60	357.	713.	378.33
597.20	314.	636.80	336.	675.	357.22	714.	378.89
598.	314.44	637.	336.11	676.	357.78	714.20	379.

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
715.	379.44	754.	401.11	793.	422.78	831.20	444.
716.	380.	755.	401.67	793.40	423.	832.	444.44
717.	380.56	755.60	402.	794.	423.33	833.	445.
717.80	381.	756.	402.22	795.	423.89	834.	445.56
718.	381.11	757.	402.78	795.20	424.	834.80	446.
719.	381.67	757.40	403.	796.	424.44	835.	446.11
719.60	382.	758.	403.33	797.	425.	836.	446.67
720.	382.22	759.	403.89	798.	425.56	836.60	447.
721.	382.78	759.78	404.	798.80	426.	837.	447.22
721.40	383.	760.	404.44	799.	426.11	838.	447.78
722.	383.33	761.	405.	800.	426.67	838.40	448.
723.	383.89	762.	405.56	800.60	427.	839.	448.33
723.20	384.	762.80	406.	801.	427.22	840.	448.89
724.	384.44	763.	406.11	802.	427.78	840.20	449.
725.	385.	764.	406.67	802.40	428.	841.	449.44
726.	385.56	764.60	407.	803.	428.33	842.	450.
726.80	386.	765.	407.22	804.	428.89	843.	450.56
727.	386.11	766.	407.78	804.20	429.	843.80	451.
728.	386.67	766.40	408.	805.	429.44	844.	451.11
728.60	387.	767.	408.33	806.	430.	845.	451.67
729.	387.22	768.	408.89	807.	430.56	845.60	452.
730.	387.78	768.20	409.	807.80	431.	846.	452.22
730.40	388.	769.	409.44	808.	431.11	847.	452.78
731.	388.33	770.	410.	809.	431.67	847.40	453.
732.	388.89	771.	410.56	809.60	432.	848.	453.33
732.20	389.	771.80	411.	810.	432.22	849.	453.89
733.	389.44	772.	411.11	811.	432.78	849.20	454.
734.	390.	773.	411.67	811.40	433.	850.	454.44
735.	390.56	773.60	412.	812.	433.33	851.	455.
735.80	391.	774.	412.22	813.	433.89	852.	455.56
736.	391.11	775.	412.78	813.20	434.	852.80	456.
737.	391.67	775.40	413.	814.	434.44	853.	456.11
737.60	392.	776.	413.33	815.	435.	854.	456.67
738.	392.22	777.	413.89	816.	435.56	854.60	457.
739.	392.78	777.20	414.	816.80	436.	855.	457.22
739.40	393.	778.	414.44	817.	436.11	856.	457.78
740.	393.33	779.	415.	818.	436.67	856.40	458.
741.	393.89	780.	415.56	818.60	437.	857.	458.33
741.20	394.	780.80	416.	819.	437.22	858.	458.89
742.	394.44	781.	416.11	820.	437.78	858.20	459.
743.	395.	782.	416.67	820.40	438.	859.	459.44
744.	395.56	782.60	417.	821.	438.33	860.	460.
744.80	396.	783.	417.22	822.	438.89	861.	460.56
745.	396.11	784.	417.78	822.20	439.	861.80	461.
746.	396.67	784.40	418.	823.	439.44	862.	461.11
746.60	397.	785.	418.33	824.	440.	863.	461.67
747.	397.22	786.	418.89	825.	440.56	863.60	462.
748.	397.78	786.20	419.	825.80	441.	864.	462.22
748.40	398.	787.	419.44	826.	441.11	865.	462.78
749.	398.33	788.	420.	827.	441.67	865.40	463.
750.	398.89	789.	420.56	827.60	442.	866.	463.33
750.20	399.	789.80	421.	828.	442.22	867.	463.89
751.	399.44	790.	421.11	829.	442.78	867.20	464.
752.	400.	791.	421.67	829.40	443.	868.	464.44
753.	400.56	791.60	422.	830.	443.33	869.	465.
753.80	401.	792.	422.22	831.	443.89	870.	465.56

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
870.80	466.	909.	487.22	948.	508.89	987.	530.56
871.	466.11	910.	487.78	948.20	509.	987.80	531.
872.	466.67	910.40	488.	949.	509.44	988.	531.11
872.60	467.	911.	488.33	950.	510.	989.	531.67
873.	467.22	912.	488.89	951.	510.56	989.60	532.
874.	467.78	912.20	489.	951.80	511.	990.	532.22
874.40	468.	913.	489.44	952.	511.11	991.	532.78
875.	468.33	914.	490.	953.	511.67	991.60	533.
876.	468.89	915.	490.56	953.60	512.	992.	533.33
876.20	469.	915.80	491.	954.	512.22	993.	533.89
877.	469.44	916.	491.11	955.	512.78	993.40	534.
878.	470.	917.	491.67	955.40	513.	994.	534.44
879.	470.56	917.60	492.	956.	513.33	995.	535.
879.80	471.	918.	492.22	957.	513.89	995.20	535.56
880.	471.11	919.	492.78	957.20	514.	996.	536.
881.	471.67	919.40	493.	958.	514.44	997.	536.11
881.60	472.	920.	493.33	959.	515.	998.	536.67
882.	472.22	921.	493.89	960.	515.56	998.80	537.
883.	472.78	921.20	494.	960.80	516.	999.	537.22
883.40	473.	922.	494.44	961.	516.11	1000.	537.78
884.	473.33	923.	495.	962.	516.67	1004.	540.
885.	473.89	924.	495.56	962.60	517.	1010.	543.33
885.20	474.	924.80	496.	963.	517.22	1020.	548.89
886.	474.44	925.	496.11	964.	517.78	1022.	550.
887.	475.	926.	496.67	964.40	518.	1030.	554.44
888.	475.56	926.60	497.	965.	518.33	1040.	560.
888.80	476.	927.	497.22	966.	518.89	1050.	565.56
889.	476.11	928.	497.78	966.20	519.	1058.	570.
890.	476.67	928.40	498.	967.	519.44	1060.	571.11
890.60	477.	929.	498.33	968.	520.	1070.	576.67
891.	477.22	930.	498.89	969.	520.56	1076.	580.
892.	477.78	930.20	499.	969.80	521.	1080.	582.22
892.40	478.	931.	499.44	970.	521.11	1090.	587.78
893.	478.33	932.	500.	971.	521.67	1094.	590.
894.	478.89	933.	500.56	971.60	522.	1100.	593.33
894.20	479.	933.80	501.	972.	522.22	1110.	598.89
895.	479.44	934.	501.11	973.	522.78	1112.	600.
896.	480.	935.	501.67	973.40	523.	1120.	604.44
897.	480.56	935.60	502.	974.	523.33	1130.	610.
897.80	481.	936.	502.22	975.	523.78	1140.	615.56
898.	481.11	937.	502.78	975.20	524.	1148.	620.
899.	481.67	937.40	503.	976.	524.44	1150.	621.11
899.60	482.	938.	503.33	977.	525.	1160.	626.67
900.	482.22	939.	503.89	978.	525.56	1166.	630.
901.	482.78	939.20	504.	978.80	526.	1170.	632.22
901.40	483.	940.	504.44	979.	526.11	1180.	637.78
902.	483.33	941.	505.	980.	526.67	1184.	640.
903.	483.89	942.	505.56	980.60	527.	1190.	643.33
903.20	484.	942.80	506.	981.	527.22	1200.	648.89
904.	484.44	943.	506.11	982.	527.78	1202.	650.
905.	485.	944.	506.67	982.40	528.	1210.	654.44
906.	485.56	944.60	507.	983.	528.33	1220.	660.
906.80	486.	945.	507.22	984.	528.89	1230.	665.56
907.	486.11	946.	507.78	984.20	529.	1238.	670.
908.	486.67	946.40	508.	985.	529.44	1240.	671.11
908.60	487.	947.	508.33	986.	530.	1250.	676.67

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
1256.	680.	1640.	893.33	2030.	1110.	2420.	1326.67
1260.	682.22	1650.	898.89	2040.	1115.56	2426.	1330.
1270.	687.78	1652.	900.	2048.	1120.	2430.	1332.22
1274.	690.	1660.	904.44	2050.	1121.11	2440.	1337.78
1280.	693.33	1670.	910.	2060.	1126.67	2444.	1340.
1290.	698.89	1680.	915.56	2066.	1130.	2450.	1343.33
1292.	700.	1688.	920.	2070.	1132.22	2460.	1348.89
1300.	704.44	1690.	921.11	2080.	1137.78	2462.	1350.
1310.	710.	1700.	926.67	2084.	1140.	2470.	1354.44
1320.	715.56	1706.	930.	2090.	1143.33	2480.	1360.
1328.	720.	1710.	932.22	2100.	1148.89	2490.	1365.56
1330.	721.11	1720.	937.78	2102.	1150.	2498.	1370.
1340.	726.67	1724.	940.	2110.	1154.44	2500.	1371.11
1346.	730.	1730.	943.33	2120.	1160.	2510.	1376.67
1350.	732.22	1740.	948.89	2130.	1165.56	2516.	1380.
1360.	737.78	1742.	950.	2138.	1170.	2520.	1382.22
1364.	740.	1750.	954.44	2140.	1171.11	2530.	1387.78
1370.	743.33	1760.	960.	2150.	1176.67	2534.	1390.
1380.	748.89	1770.	965.56	2156.	1180.	2540.	1393.33
1382.	750.	1778.	970.	2160.	1182.22	2550.	1398.89
1390.	754.44	1780.	971.11	2170.	1187.78	2552.	1400.
1400.	760.	1790.	976.67	2174.	1190.	2560.	1404.44
1410.	765.56	1796.	980.	2180.	1193.33	2570.	1410.
1418.	770.	1800.	982.22	2190.	1198.89	2580.	1415.56
1420.	771.11	1810.	987.78	2192.	1200.	2588.	1420.
1430.	776.67	1814.	990.	2200.	1204.44	2590.	1421.11
1436.	780.	1820.	993.33	2210.	1210.	2600.	1426.67
1440.	782.22	1830.	998.89	2220.	1215.56	2606.	1430.
1450.	787.78	1832.	1000.	2228.	1220.	2610.	1432.22
1454.	790.	1840.	1004.44	2230.	1221.11	2620.	1437.78
1460.	793.33	1850.	1010.	2240.	1226.67	2624.	1440.
1470.	798.89	1860.	1015.56	2246.	1230.	2630.	1443.33
1472.	800.	1868.	1020.	2250.	1232.22	2640.	1448.89
1480.	804.44	1870.	1021.11	2260.	1237.78	2642.	1450.
1490.	810.	1880.	1026.67	2264.	1240.	2650.	1454.44
1500.	815.56	1886.	1030.	2270.	1243.33	2660.	1460.
1508.	820.	1890.	1032.22	2280.	1248.89	2670.	1465.56
1510.	821.11	1900.	1037.78	2282.	1250.	2678.	1470.
1520.	826.67	1904.	1040.	2290.	1254.44	2680.	1471.11
1526.	830.	1910.	1043.33	2300.	1260.	2690.	1476.67
1530.	832.22	1920.	1048.89	2310.	1265.56	2696.	1480.
1540.	837.78	1922.	1050.	2318.	1270.	2700.	1482.22
1544.	840.	1930.	1054.44	2320.	1271.11	2710.	1487.78
1550.	843.33	1940.	1060.	2330.	1276.67	2714.	1490.
1560.	848.89	1950.	1065.56	2336.	1280.	2720.	1493.33
1562.	850.	1958.	1070.	2340.	1282.22	2730.	1498.89
1570.	854.44	1960.	1071.11	2350.	1287.78	2732.	1500.
1580.	860.	1970.	1076.67	2354.	1290.	2740.	1504.44
1590.	865.56	1976.	1080.	2360.	1293.33	2750.	1510.
1598.	870.	1980.	1082.22	2370.	1298.89	2760.	1515.56
1600.	871.11	1990.	1087.78	2372.	1300.	2768.	1520.
1610.	876.67	1994.	1090.	2380.	1304.44	2770.	1521.11
1616.	880.	2000.	1093.33	2390.	1310.	2780.	1526.67
1620.	882.22	2010.	1098.89	2400.	1315.56	2786.	1530.
1630.	887.78	2012.	1100.	2408.	1320.	2790.	1532.22
1634.	890.	2020.	1104.44	2410.	1321.11	2800.	1537.78

Equivalent Temperature Readings for Fahrenheit and Centigrade Scales—*Continued*

Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.	Fahrenheit Degs.	Centigrade Degs.
2804.	1540.	3010.	1654.44	3220.	1771.11	3430.	1887.78
2810.	1543.33	3020.	1660.	3230.	1776.67	3434.	1890.
2820.	1548.89	3030.	1665.56	3236.	1780.	3440.	1893.33
2822.	1550.	3038.	1670.	3240.	1782.22	3450.	1898.89
2830.	1554.44	3040.	1671.11	3250.	1787.78	3452.	1900.
2840.	1560.	3050.	1676.67	3254.	1790.	3460.	1904.44
2850.	1565.56	3056.	1680.	3260.	1793.33	3470.	1910.
2858.	1570.	3060.	1682.22	3270.	1798.89	3480.	1915.56
2860.	1571.11	3070.	1687.78	3272.	1800.	3488.	1920.
2870.	1576.67	3074.	1690.	3280.	1804.44	3490.	1921.11
2876.	1580.	3080.	1693.33	3290.	1810.	3500.	1926.67
2880.	1582.22	3090.	1698.89	3300.	1815.56	3506.	1930.
2890.	1587.78	3092.	1700.	3308.	1820.	3510.	1932.22
2894.	1590.	3100.	1704.44	3310.	1821.11	3520.	1937.78
2900.	1593.33	3110.	1710.	3320.	1826.67	3524.	1940.
2910.	1598.89	3120.	1715.56	3326.	1830.	3530.	1943.33
2912.	1600.	3128.	1720.	3330.	1832.22	3540.	1948.89
2920.	1604.44	3130.	1721.11	3340.	1837.78	3542.	1950.
2930.	1610.	3140.	1726.67	3344.	1840.	3550.	1954.44
2940.	1615.56	3146.	1730.	3350.	1843.33	3560.	1960.
2948.	1620.	3150.	1732.22	3360.	1848.89	3570.	1965.56
2950.	1621.11	3160.	1737.78	3362.	1850.	3578.	1970.
2960.	1626.67	3164.	1740.	3370.	1854.44	3580.	1971.11
2966.	1630.	3170.	1743.33	3380.	1860.	3590.	1976.67
2970.	1632.22	3180.	1748.89	3390.	1865.56	3596.	1980.
2980.	1637.78	3182.	1750.	3398.	1870.	3600.	1982.22
2984.	1640.	3190.	1754.44	3400.	1871.11	3610.	1987.78
2990.	1643.33	3200.	1760.	3410.	1876.67	3614.	1990.
3000.	1648.89	3210.	1765.56	3416.	1880.	3620.	1993.33
3002.	1650.	3218.	1770.	3420.	1882.22	3630.	1998.89

Specific Gravity Equivalents for Degrees Baumé for Liquids Heavier than Water

Table adopted by the U. S. Bureau of Standards from the formula:

$$\text{Degrees Baumé} = 145 - \frac{145}{{}^{*}\text{Specific Gravity } \frac{60^\circ}{60^\circ}\text{ F.}}$$

Baumé.	Specific Gravity.	Lbs. per Gallon.	Baumé.	Specific Gravity.	Lbs. per Gallon.	Baumé.	Specific Gravity.	Lbs. per Gallon.	Baumé.	Specific Gravity.	Lbs. per Gallon.
0	1.0000	8.33	19	1.1508	9.59	38	1.3551	11.29	57	1.6477	13.72
1	1.0069	8.38	20	1.1600	9.67	39	1.3679	11.39	58	1.6667	13.87
2	1.0140	8.46	21	1.1694	9.74	40	1.3810	11.51	59	1.6860	14.04
3	1.0211	8.51	22	1.1789	9.81	41	1.3942	11.61	60	1.7059	14.21
4	1.0284	8.56	23	1.1885	9.90	42	1.4078	11.72	61	1.7262	14.38
5	1.0357	8.63	24	1.1983	9.99	43	1.4216	11.84	62	1.7470	14.55
6	1.0432	8.69	25	1.2083	10.07	44	1.4356	11.96	63	1.7683	14.72
7	1.0507	8.75	26	1.2185	10.16	45	1.4500	12.08	64	1.7901	14.91
8	1.0584	8.81	27	1.2288	10.24	46	1.4646	12.21	65	1.8125	15.10
9	1.0662	8.88	28	1.2393	10.32	47	1.4796	12.33	66	1.8354	15.29
10	1.0741	8.94	29	1.2500	10.41	48	1.4948	12.46	67	1.8590	15.48
11	1.0821	9.01	30	1.2609	10.51	49	1.5104	12.58	68	1.8831	15.68
12	1.0902	9.09	31	1.2719	10.59	50	1.5263	12.72	69	1.9079	15.89
13	1.0985	9.15	32	1.2832	10.69	51	1.5426	12.85	70	1.9333	16.10
14	1.1069	9.21	33	1.2946	10.78	52	1.5591	12.99	71	1.9595	16.32
15	1.1154	9.29	34	1.3063	10.84	53	1.5761	13.13	72	1.9864	16.55
16	1.1240	9.36	35	1.3182	10.98	54	1.5934	13.27	73	2.0139	16.78
17	1.1328	9.43	36	1.3303	11.09	55	1.6111	13.42	74	2.0423	17.01
18	1.1417	9.51	37	1.3426	11.18	56	1.6292	13.57	75	2.0714	17.25

* All densities taken at temperature of 60° F. and referred to distilled water at 60° F. as standard.

Specific Gravity Equivalents for Degrees Baumé for Liquids Lighter than Water

Table adopted by the U. S. Bureau of Standards from the formula:

$$\text{Degrees Baumé} = \frac{140}{\text{*Specific Gravity } \frac{60^\circ}{60^\circ}\text{ F.}} - 130$$

Baumé	Specific Gravity.	Lbs. per Gallon.	Baumé.	Specific Gravity.	Lbs. per Gallon.	Baumé.	Specific Gravity.	Lbs. per Gallon.	Baumé.	Specific Gravity.	Lbs. per Gallon.
10	1.0000	8.33	36	0.8434	7.03	61	0.7330	6.11	86	0.6481	5.40
11	0.9929	8.27	37	0.8383	6.98	62	0.7292	6.07	87	0.6452	5.38
12	0.9859	8.21	38	0.8333	6.94	63	0.7254	6.04	88	0.6422	5.36
13	0.9790	8.16	39	0.8284	6.90	64	0.7216	6.01	89	0.6393	5.33
14	0.9722	8.10	40	0.8235	6.86	65	0.7179	5.98	90	0.6364	5.30
15	0.9655	8.04	41	0.8187	6.82	66	0.7143	5.95	91	0.6335	5.28
16	0.9589	7.99	42	0.8140	6.78	67	0.7107	5.92	92	0.6306	5.25
17	0.9524	7.93	43	0.8092	6.74	68	0.7071	5.89	93	0.6278	5.23
18	0.9459	7.88	44	0.8046	6.70	69	0.7035	5.86	94	0.6250	5.21
19	0.9396	7.83	45	0.8000	6.66	70	0.7000	5.83	95	0.6222	5.18
20	0.9333	7.78	46	0.7955	6.63	71	0.6965	5.80	96	0.6195	5.16
21	0.9272	7.72	47	0.7910	6.59	72	0.6931	5.78	97	0.6167	5.14
22	0.9211	7.67	48	0.7865	6.55	73	0.6897	5.75	98	0.6140	5.11
23	0.9150	7.62	49	0.7821	6.52	74	0.6863	5.72	99	0.6114	5.09
24	0.9091	7.57	50	0.7778	6.48	75	0.6829	5.69	100	0.6087	5.07
25	0.9032	7.53	51	0.7735	6.44	76	0.6796	5.66	101	0.6061	5.05
26	0.8974	7.48	52	0.7692	6.41	77	0.6763	5.63	102	0.6034	5.03
27	0.8917	7.43	53	0.7650	6.37	78	0.6731	5.60	103	0.6009	5.00
28	0.8861	7.38	54	0.7609	6.34	79	0.6699	5.58	104	0.5983	4.98
29	0.8805	7.34	55	0.7568	6.30	80	0.6667	5.55	105	0.5957	4.96
30	0.8750	7.29	56	0.7527	6.27	81	0.6635	5.52	106	0.5932	4.94
31	0.8696	7.24	57	0.7487	6.24	82	0.6604	5.50	107	0.5907	4.92
32	0.8642	7.20	58	0.7447	6.20	83	0.6573	5.48	108	0.5882	4.90
33	0.8589	7.15	59	0.7407	6.17	84	0.6542	5.45	109	0.5858	4.88
34	0.8537	7.11	60	0.7368	6.14	85	0.6512	5.42	110	0.5833	4.86
35	0.8485	7.07									

* All densities taken at temperature of 60° F. and referred to distilled water at 60° F. as standard.

Corresponding Specific Gravity for Spindle Readings of Various Hydrometers.

Spindle Reading	Twaddell[c]	Barkometer	Salinometer[d]	Baumé[a] (Amer.)	Brix[b]
1	1.005	1.001	1.002	1.007	1.004
2	1.010	1.002	1.003	1.014	1.008
3	1.015	1.003	1.005	1.021	1.012
4	1.020	1.004	1.007	1.028	1.016
5	1.025	1.005	1.009	1.036	1.020
6	1.030	1.006	1.010	1.043	1.024
7	1.035	1.007	1.012	1.051	1.028
8	1.040	1.008	1.014	1.058	1.032
9	1.045	1.009	1.016	1.066	1.036
10	1.050	1.010	1.017	1.074	1.040
11	1.055	1.011	1.019	1.082	1.044
12	1.060	1.012	1.021	1.090	1.049
13	1.065	1.013	1.023	1.098	1.053
14	1.070	1.014	1.025	1.107	1.057
15	1.075	1.015	1.026	1.115	1.061
16	1.080	1.016	1.028	1.124	1.066
17	1.085	1.017	1.030	1.133	1.070
18	1.090	1.018	1.032	1.142	1.074
19	1.095	1.019	1.034	1.151	1.079
20	1.100	1.020	1.035	1.160	1.083
21	1.105	1.021	1.037	1.169	1.088
22	1.110	1.022	1.039	1.179	1.092
23	1.115	1.023	1.041	1.188	1.097
24	1.120	1.024	1.043	1.198	1.101
25	1.125	1.025	1.045	1.208	1.106
26	1.130	1.026	1.046	1.218	1.111
27	1.135	1.027	1.048	1.229	1.115
28	1.140	1.028	1.050	1.239	1.120
29	1.145	1.029	1.052	1.250	1.125
30	1.150	1.030	1.054	1.261	1.130
31	1.155	1.031	1.056	1.272	1.134
32	1.160	1.032	1.058	1.283	1.139
33	1.165	1.033	1.059	1.295	1.144
34	1.170	1.034	1.061	1.306	1.149
35	1.175	1.035	1.063	1.318	1.154
36	1.180	1.036	1.065	1.330	1.159
37	1.185	1.037	1.067	1.343	1.164
38	1.190	1.038	1.069	1.355	1.169
39	1.195	1.039	1.071	1.368	1.174
40	1.200	1.040	1.073	1.381	1.179
41	1.205	1.041	1.075	1.394	1.185
42	1.210	1.042	1.077	1.408	1.190
43	1.215	1.043	1.079	1.422	1.195
44	1.220	1.044	1.081	1.436	1.200
45	1.225	1.045	1.083	1.450	1.206
46	1.230	1.046	1.085	1.465	1.211

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[a] Liquids heavier than water @ 60° F. Deg. Baumé $= 145 - \frac{145}{\text{Sp. Gr.}}$

[b] Mategezek and Scheibler. Sp. Gr. of solution at 17.5° C. where water at 17.5° C. = 1.

[c] Castel-Evans, Physico-Chemical Tables. Sp. Gr. $1 + \frac{5°(\text{Tw})}{1000}$

[d] Engelhardt, U. S. Mineral Resources.

Corresponding Specific Gravity for Spindle Readings of Various Hydrometers (*Continued*).

Spindle Reading	Twaddell[c]	Barkometer	Salinometer[d]	Baumé[a] (Amer.)	Brix[b]
47	1.235	1.047	1.087	1.480	1.216
48	1.240	1.048	1.089	1.495	1.222
49	1.245	1.049	1.091	1.510	1.227
50	1.250	1.050	1.093	1.526	1.233
51	1.255	....	1.095	1.543	1.238
52	1.260	....	1.097	1.559	1.244
53	1.265	....	1.100	1.576	1.250
54	1.270	....	1.102	1.593	1.255
55	1.275	....	1.104	1.611	1.261
56	1.280	....	1.106	1.629	1.267
57	1.285	....	1.108	1.648	1.272
58	1.290	....	1.110	1.667	1.278
59	1.295	....	1.112	1.686	1.284
60	1.300	....	1.114	1.706	1.290
61	1.305	....	1.116	1.726	1.296
62	1.310	....	1.118	1.747	1.302
63	1.315	....	1.121	1.768	1.308
64	1.320	....	1.123	1.790	1.314
65	1.325	....	1.125	1.812	1.320
66	1.330	....	1.127	1.835	1.326
67	1.335	....	1.129	1.859	1.332
68	1.340	....	1.131	1.883	1.338
69	1.345	....	1.133	1.908	1.345
70	1.350	....	1.136	1.933	1.351
71	1.355	....	1.138	1.959	1.357
72	1.360	....	1.140	1.986	1.364
73	1.365	....	1.142	2.014	1.370
74	1.370	....	1.144	2.042	1.376
75	1.375	....	1.147	2.071	1.383
76	1.380	....	1.149	2.101	1.389
77	1.385	....	1.151	2.132	1.396
78	1.390	....	1.154	2.164	1.402
79	1.395	....	1.156	2.197	1.409
80	1.400	....	1.158	....	1.416
81	1.405	....	1.160	....	1.422
82	1.410	....	1.163	....	1.429
83	1.415	....	1.165	....	1.436
84	1.420	....	1.167	....	1.443
85	1.425	....	1.170	....	1.450
86	1.430	....	1.172	....	1.457
87	1.435	....	1.175	....	1.464
88	1.440	....	1.177	....	1.471
89	1.445	....	1.179	....	1.478
90	1.450	....	1.182	....	1.485
91	1.455	....	1.184	....	1.492
92	1.460	....	1.186	....	1.499
93	1.465	....	1.189	....	1.506
94	1.470	....	1.191	....	1.513
95	1.475	....	1.194	....	1.521
96	1.480	....	1.196	....	1.527
97	1.485	....	1.198	....	1.534
98	1.490	....	1.201	....	1.542
99	1.495	....	1.203	....	1.549
100	1.500	....	1.205	....	1.556

From Webre and Robinson, Evaporation, The Chemical Catalog Co., Inc.

Hydrochloric Acid.

Bé.°	Sp. Gr.	Tw°	%HCl.	Bé.°	Sp. Gr.	Tw.°	%HCl.	Bé.°	Sp. Gr.	Tw.°	%HCl.
1.00	1.0069	1.38	1.40	16.0	1.1240	24.80	24.57	20.8	1.1675	33.50	32.93
2.00	1.0140	2.80	2.82	16.1	1.1248	24.96	24.73	20.9	1.1684	33.68	33.12
3.00	1.0211	4.22	4.25	16.2	1.1256	25.12	24.90	21.0	1.1694	33.88	33.31
4.00	1.0284	5.68	5.69	16.3	1.1265	25.30	25.06	21.1	1.1703	34.06	33.50
5.00	1.0357	7.14	7.15	16.4	1.1274	25.48	25.23	21.2	1.1713	34.26	33.69
5.25	1.0375	7.50	7.52	16.5	1.1283	25.66	25.39	21.3	1.1722	34.44	33.88
5.50	1.0394	7.88	7.89	16.6	1.1292	25.84	25.56	21.4	1.1732	34.64	34.07
5.75	1.0413	8.26	8.26	16.7	1.1301	26.02	25.72	21.5	1.1741	34.82	34.26
6.00	1.0432	8.64	8.64	16.8	1.1310	26.20	25.89	21.6	1.1751	35.02	34.45
6.25	1.0450	9.00	9.02	16.9	1.1319	26.38	26.05	21.7	1.1760	35.20	34.64
6.50	1.0469	9.38	9.40	17.0	1.1328	26.56	26.22	21.8	1.1770	35.40	34.83
6.75	1.0488	9.76	9.78	17.1	1.1336	26.72	26.39	21.9	1.1779	35.58	35.02
7.00	1.0507	10.14	10.17	17.2	1.1345	26.90	26.56	22.0	1.1789	35.78	35.21
7.25	1.0526	10.52	10.55	17.3	1.1354	27.08	26.73	22.1	1.1798	35.96	35.40
7.50	1.0545	10.90	10.94	17.4	1.1363	27.26	26.90	22.2	1.1808	36.16	35.59
7.75	1.0564	11.28	11.32	17.5	1.1372	27.44	27.07	22.3	1.1817	36.34	35.78
8.00	1.0584	11.68	11.71	17.6	1.1381	27.62	27.24	22.4	1.1827	36.54	35.97
8.25	1.0603	12.06	12.09	17.7	1.1390	27.80	27.41	22.5	1.1836	36.72	36.16
8.50	1.0623	12.46	12.48	17.8	1.1399	27.98	27.58	22.6	1.1846	36.92	36.35
8.75	1.0642	12.84	12.87	17.9	1.1408	28.16	27.75	22.7	1.1856	37.12	36.54
9.00	1.0662	13.24	13.26	18.0	1.1417	28.34	27.92	22.8	1.1866	37.32	36.73
9.25	1.0681	13.62	13.65	18.1	1.1426	28.52	28.09	22.9	1.1875	37.50	36.93
9.50	1.0701	14.02	14.04	18.2	1.1435	28.70	28.26	23.0	1.1885	37.70	37.14
9.75	1.0721	14.42	14.43	18.3	1.1444	28.88	28.44	23.1	1.1895	37.90	37.36
10.00	1.0741	14.82	14.83	18.4	1.1453	29.06	28.61	23.2	1.1904	38.08	37.58
10.25	1.0761	15.22	15.22	18.5	1.1462	29.24	28.78	23.3	1.1914	38.28	37.80
10.50	1.0781	15.62	15.62	18.6	1.1471	29.42	28.95	23.4	1.1924	38.48	38.03
10.75	1.0801	16.02	16.01	18.7	1.1480	29.60	29.13	23.5	1.1934	38.68	38.26
11.00	1.0821	16.42	16.41	18.8	1.1489	29.78	29.30	23.6	1.1944	38.88	38.49
11.25	1.0841	16.82	16.81	18.9	1.1498	29.96	29.48	23.7	1.1953	39.06	38.72
11.50	1.0861	17.22	17.21	19.0	1.1508	30.16	29.65	23.8	1.1963	39.26	38.95
11.75	1.0881	17.62	17.61	19.1	1.1517	30.34	29.83	23.9	1.1973	39.46	39.18
12.00	1.0902	18.04	18.01	19.2	1.1526	30.52	30.00	24.0	1.1983	39.66	39.41
12.25	1.0922	18.44	18.41	19.3	1.1535	30.70	30.18	24.1	1.1993	39.86	39.64
12.50	1.0943	18.86	18.82	19.4	1.1544	30.88	30.35	24.2	1.2003	40.06	39.86
12.75	1.0964	19.28	19.22	19.5	1.1554	31.08	30.53	24.3	1.2013	40.26	40.09
13.00	1.0985	19.70	19.63	19.6	1.1563	31.26	30.71	24.4	1.2023	40.46	40.32
13.25	1.1006	20.12	20.04	19.7	1.1572	31.44	30.90	24.5	1.2033	40.66	40.55
13.50	1.1027	20.54	20.45	19.8	1.1581	31.62	31.08	24.6	1.2043	40.86	40.78
13.75	1.1048	20.96	20.86	19.9	1.1590	31.80	31.27	24.7	1.2053	41.06	41.01
14.00	1.1069	21.38	21.27	20.0	1.1600	32.00	31.45	24.8	1.2063	41.26	41.24
14.25	1.1090	21.80	21.68	20.1	1.1609	32.18	31.64	24.9	1.2073	41.46	41.48
14.50	1.1111	22.22	22.09	20.2	1.1619	32.38	31.82	25.0	1.2083	41.66	41.72
14.75	1.1132	22.64	22.50	20.3	1.1628	32.56	32.01	25.1	1.2093	41.86	41.99
15.00	1.1154	23.08	22.92	20.4	1.1637	32.74	32.19	25.2	1.2103	42.06	42.30
15.25	1.1176	23.52	23.33	20.5	1.1647	32.94	32.38	25.3	1.2114	42.28	42.64
15.50	1.1197	23.94	23.75	20.6	1.1656	33.12	32.56	25.4	1.2124	42.48	43.01
15.75	1.1219	24.38	24.16	20.7	1.1666	33.32	32.75	25.5	1.2134	42.68	43.40

Specific Gravity determinations were made at 60° F., compared with water at 60° F.
From the Specific Gravities, the corresponding degrees Baumé were calculated by the following formula:

$$\text{Baumé} = 145 - \frac{145}{\text{Sp. Gr.}}$$

* Baumé Hydrometers for use with this table must be graduated by the above formula which formula should always be printed on the scale.

Atomic weights from F. W. Clarke's table of 1901. O = 16.

ALLOWANCE FOR TEMPERATURE.

10—15° Be. — 1/40° Be. or .0002 Sp. Gr. for 1° F.
15—22° Be. — 1/30° Be. or .0003 " " " 1° F.
22—25° Be. — 1/28° Be. or .00035" " " 1° F.

Authority—W. C. Ferguson.

This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

W. H. BOWER,
HENRY HOWARD,
JAS. L. MORGAN,
ARTHUR WYMAN,
A. G. ROSENGARTEN,
Executive Committee.

New York, May 14th, 1903.

Courtesy the Manufacturing Chemists' Association of the United States.

Sulfuric Acid

Bé°	Sp. Gr.	Tw.°	Percent H_2SO_4	Weight of 1 cu. ft. in lbs. av.	Percent O. V.	Pounds O. V. in 1 cu. ft.	* Freezing (Melting) Point.
0	1.0000	0.0	0.00	62.37	0.00	0.00	32.0° F.
1	1.0069	1.4	1.02	62.80	1.09	.68	31.2 “
2	1.0140	2.8	2.08	63.24	2.23	1.41	30.5 “
3	1.0211	4.2	3.13	63.69	3.36	2.14	29.8 “
4	1.0284	5.7	4.21	64.14	4.52	2.90	28.9 “
5	1.0357	7.1	5.28	64.60	5.67	3.66	28.1 “
6	1.0432	8.6	6.37	65.06	6.84	4.45	27.2 “
7	1.0507	10.1	7.45	65.53	7.99	5.24	26.3 “
8	1.0584	11.7	8.55	66.01	9.17	6.06	25.1 “
9	1.0662	13.2	9.66	66.50	10.37	6.89	24.0 “
10	1.0741	14.8	10.77	66.99	11.56	7.74	22.8 “
11	1.0821	16.4	11.89	67.49	12.76	8.61	21.5 “
12	1.0902	18.0	13.01	68.00	13.96	9.49	20.0 “
13	1.0985	19.7	14.13	68.51	15.16	10.39	18.3 “
14	1.1069	21.4	15.25	69.04	16.36	11.30	16.6 “
15	1.1154	23.1	16.38	69.57	17.58	12.23	14.7 “
16	1.1240	24.8	17.53	70.10	18.81	13.19	12.6 “
17	1.1328	26.6	18.71	70.65	20.08	14.18	10.2 “
18	1.1417	28.3	19.89	71.21	21.34	15.20	7.7 “
19	1.1508	30.2	21.07	71.78	22.61	16.23	4.8 “
20	1.1600	32.0	22.25	72.35	23.87	17.27	+ 1.6 “
21	1.1694	33.9	23.43	72.94	25.14	18.34	− 1.8 “
22	1.1789	35.8	24.61	73.53	26.41	19.42	− 6.0 “
23	1.1885	37.7	25.81	74.13	27.69	20.53	− 11 “
24	1.1983	39.7	27.03	74.74	29.00	21.68	− 16 “
25	1.2083	41.7	28.28	75.36	30.34	22.87	− 23 “
26	1.2185	43.7	29.53	76.00	31.69	24.08	− 30 “
27	1.2288	45.8	30.79	76.64	33.04	25.32	− 39 “
28	1.2393	47.9	32.05	77.30	34.39	26.58	− 49 “
29	1.2500	50.0	33.33	77.96	35.76	27.88	− 61 “
30	1.2609	52.2	34.63	78.64	37.16	29.22	− 74 “
31	1.2719	54.4	35.93	79.33	38.55	30.58	− 82 “
32	1.2832	56.6	37.26	80.03	39.98	32.00	− 96 “
33	1.2946	58.9	38.58	80.74	41.40	33.42	− 97 “
34	1.3063	61.3	39.92	81.47	42.83	34.90	− 91 “
35	1.3182	63.6	41.27	82.22	44.28	36.41	− 81 “
36	1.3303	66.1	42.63	82.97	45.74	37.95	− 70 “
37	1.3426	68.5	43.99	83.74	47.20	39.53	− 60 “
38	1.3551	71.0	45.35	84.52	48.66	41.13	− 53 “
39	1.3679	73.6	46.72	85.32	50.13	42.77	− 47 “
40	1.3810	76.2	48.10	86.13	51.61	44.45	− 41 “
41	1.3942	78.8	49.47	86.96	53.08	46.16	− 35 “
42	1.4078	81.6	50.87	87.80	54.58	47.92	− 31 “
43	1.4216	84.3	52.26	88.67	56.07	49.72	− 27 “
44	1.4356	87.1	53.66	89.54	57.58	51.56	− 23 “
45	1.4500	90.0	55.07	90.44	59.09	53.44	− 20 “
46	1.4646	92.9	56.48	91.35	60.60	55.36	− 14 “
47	1.4796	95.9	57.90	92.28	62.13	57.33	− 15 “
48	1.4948	99.0	59.32	93.23	63.65	59.34	− 18 “
49	1.5104	102.1	60.75	94.20	65.18	61.40	− 22 “
50	1.5263	105.3	62.18	95.20	66.72	63.52	− 27 “
51	1.5426	108.5	63.66	96.21	68.31	65.72	− 33 “
52	1.5591	111.8	65.13	97.24	69.89	67.96	− 39 “
53	1.5761	115.2	66.63	98.30	71.50	70.28	− 49 “
54	1.5934	118.7	68.13	99.38	73.11	72.66	− 59 “
55	1.6111	122.2	69.65	100.48	74.74	75.10	.. Below − 40
56	1.6292	125.8	71.17	101.61	76.37	77.60	..
57	1.6477	129.5	72.75	102.77	78.07	80.23	..
58	1.6667	133.3	74.36	103.95	79.79	82.95	..
59	1.6860	137.2	75.99	105.16	81.54	85.75	− 7
60	1.7059	141.2	77.67	106.40	83.35	88.68	+ 12.6 F.
61	1.7262	145.2	79.43	107.66	85.23	91.76	27.3 “
62	1.7470	149.4	81.30	108.96	87.24	95.06	39.1 “
63	1.7683	153.7	83.34	110.29	89.43	98.63	46.1 “
64	1.7901	158.0	85.66	111.65	91.92	102.63	46.4 “
64¼	1.7957	159.1	86.33	112.00	92.64	103.75	43.6 “
64½	1.8012	160.2	87.04	112.34	93.40	104.93	41.1 “
64¾	1.8068	161.4	87.81	112.69	94.23	106.19	37.9 “
65	1.8125	162.5	88.65	113.05	95.13	107.54	33.1 “
65¼	1.8182	163.6	89.55	113.40	96.10	108.97	24.6 “
65½	1.8239	164.8	90.60	113.76	97.22	110.60	13.4 “
65¾	1.8297	165.9	91.80	114.12	98.51	112.42	− 1 “
66	1.8354	167.1	93.19	114.47	100.00	114.47	− 29 “

APPROXIMATE BOILING POINTS

50° Bé, 295° F.
60° “ 386° “
61° “ 400° “
62° “ 415° “
63° “ 432° “
64° “ 451° “
65° “ 485° “
66° “ 538° “

FIXED POINTS

Sp. Gr.	Percent H_2SO_4	Sp. Gr.	Percent H_2SO_4
1.0000	.00	1.5281	62.34
1.0048	.71	1.5440	63.79
1.0347	5.14	1.5748	66.51
1.0649	9.48	1.6272	71.00
1.0992	14.22	1.6679	74.46
1.1353	19.04	1.7044	77.54
1.1736	23.94	1.7258	79.40
1.2105	28.55	1.7472	81.32
1.2513	33.49	1.7700	83.47
1.2951	38.64	1.7959	86.36
1.3441	44.15	1.8117	88.53
1.3947	49.52	1.8194	89.75
1.4307	53.17	1.8275	91.32
1.4667	56.68	1.8354	93.19
1.4822	58.14	....	....

ALLOWANCE FOR TEMPERATURE

At 10° Bé, .029° Bé or .00023 Sp. Gr. = 1° F.
“ 20° “ .036° “ .00034 “ = 1° “
“ 30° “ .035° “ .00039 “ = 1° “
“ 40° “ .031° “ .00041 “ = 1° “
“ 50° “ .028° “ .00045 “ = 1° “
“ 60° “ .026° “ .00053 “ = 1° “
“ 63° “ .026° “ .00057 “ = 1° “
“ 66° “ .0235° “ .00054 “ = 1° “

Percent 60° Bé	Pounds 60° Bé in 1 cu. ft.	Percent 50° Bé	Pounds 50° Bé in 1 cu. ft.
61.93	53.34	77.36	66.63
63.69	55.39	79.56	69.19
65.50	57.50	81.81	71.83
67.28	59.66	84.05	74.53
69.09	61.86	86.30	77.27
70.90	64.12	88.56	80.10
72.72	66.43	90.83	82.98
74.55	68.79	93.12	85.93
76.37	71.20	95.40	88.94
78.22	73.68	97.70	92.03
80.06	76.21	100.00	95.20
81.96	78.85	102.38	98.50
83.86	81.54	104.74	101.85
85.79	84.33	107.15	105.33
87.72	87.17	109.57	108.89
89.67	90.10	112.01	112.55
91.63	93.11	114.46	116.30
93.67	96.26	117.00	120.24
95.74	99.52	119.59	124.31
97.84	102.89	122.21	128.52
100.00	106.40	124.91	132.91
102.27	110.10	127.74	137.52
104.67	114.05	130.75	142.47
107.30	118.34	134.03	147.82
110.29	123.14	137.76	153.81
111.15	124.49	138.84	155.50
112.06	125.89	139.98	157.25
113.05	127.40	141.22	159.14
114.14	129.03	142.57	161.17
115.30	130.75	144.02	163.32
116.65	132.70	145.71	165.76
118.19	134.88	147.63	168.48
119.98	137.34	149.87	171.56

Specific Gravity determinations were made at 60° F., compared with water at 60° F.

From the Specific Gravities, the corresponding degrees Baumé were calculated by the following formula:

$$\text{Baumé} = 145 - \frac{145}{\text{Sp. Gr.}}$$

Baumé Hydrometers for use with this table must be graduated by the above formula, which formula should always be printed on the scale.

66° Baumé = Sp. Gr. 1.8354.
1 cu. ft. water at 60° F. weighs 62.37 lbs. av.
Atomic weights from F. W. Clarke's table of 1901. O = 16.
H_2SO_4 = 100 per cent.

	H_2SO_4	O. V.	60°
O. V.	93.19	100.00	119.98
60°	77.67	83.35	100.00
50°	62.18	66.72	80.06

Acids stronger than 66° Bé should have their percentage compositions determined by chemical analysis.

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* Calculated from Pickering's results, Journal of London Chemical Society, vol. 57, p. 363.

Authorities—W. C. Ferguson; H. P. Talbot.

This table has been approved and adopted as a standard by the Manufacturing Chemists' Association of the United States.

EXECUTIVE COMMITTEE.

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New York, June 2, 1926

Courtesy the Manufacturing Chemists' Association of the United States.

Nitric Acid

Bé.°	Sp. Gr.	Tw.°	%HNO_3.	Bé.°	Sp. Gr.	Tw.°	%HNO_3.	Bé.°	Sp. Gr.	Tw.°	%HNO_3.
10.00	1.0741	14.82	12.86	23.00	1.1885	37.70	30.49	36.00	1.3303	66.06	52.30
10.25	1.0761	15.22	13.18	23.25	1.1910	38.20	30.86	36.25	1.3334	66.68	52.81
10.50	1.0781	15.62	13.49	23.50	1.1934	38.68	31.21	36.50	1.3364	67.28	53.32
10.75	1.0801	16.02	13.81	23.75	1.1959	39.18	31.58	36.75	1.3395	67.90	53.84
11.00	1.0821	16.42	14.13	24.00	1.1983	39.66	31.94	37.00	1.3426	68.52	54.36
11.25	1.0841	16.82	14.44	24.25	1.2008	40.16	32.31	37.25	1.3457	69.14	54.89
11.50	1.0861	17.22	14.76	24.50	1.2033	40.66	32.68	37.50	1.3488	69.76	55.43
11.75	1.0881	17.62	15.07	24.75	1.2058	41.16	33.05	37.75	1.3520	70.40	55.97
12.00	1.0902	18.04	15.41	25.00	1.2083	41.66	33.42	38.00	1.3551	71.02	56.52
12.25	1.0922	18.44	15.72	25.25	1.2109	42.18	33.80	38.25	1.3583	71.66	57.08
12.50	1.0943	18.86	16.05	25.50	1.2134	42.68	34.17	38.50	1.3615	72.30	57.65
12.75	1.0964	19.28	16.39	25.75	1.2160	43.20	34.56	38.75	1.3647	72.94	58.23
13.00	1.0985	19.70	16.72	26.00	1.2185	43.70	34.94	39.00	1.3679	73.58	58.82
13.25	1.1006	20.12	17.05	26.25	1.2211	44.22	35.33	39.25	1.3712	74.24	59.43
13.50	1.1027	20.54	17.38	26.50	1.2236	44.72	35.70	39.50	1.3744	74.88	60.06
13.75	1.1048	20.96	17.71	26.75	1.2262	45.24	36.09	39.75	1.3777	75.54	60.71
14.00	1.1069	21.38	18.04	27.00	1.2288	45.76	36.48	40.00	1.3810	76.20	61.38
14.25	1.1090	21.80	18.37	27.25	1.2314	46.28	36.87	40.25	1.3843	76.86	62.07
14.50	1.1111	22.22	18.70	27.50	1.2340	46.80	37.26	40.50	1.3876	77.52	62.77
14.75	1.1132	22.64	19.02	27.75	1.2367	47.34	37.67	40.75	1.3909	78.18	63.48
15.00	1.1154	23.08	19.36	28.00	1.2393	47.86	38.06	41.00	1.3942	78.84	64.20
15.25	1.1176	23.52	19.70	28.25	1.2420	48.40	38.46	41.25	1.3976	79.52	64.93
15.50	1.1197	23.94	20.02	28.50	1.2446	48.92	38.85	41.50	1.4010	80.20	65.67
15.75	1.1219	24.38	20.36	28.75	1.2473	49.46	39.25	41.75	1.4044	80.88	66.42
16.00	1.1240	24.80	20.69	29.00	1.2500	50.00	39.66	42.00	1.4078	81.56	67.18
16.25	1.1262	25.24	21.03	29.25	1.2527	50.54	40.06	42.25	1.4112	82.24	67.95
16.50	1.1284	25.68	21.36	29.50	1.2554	51.08	40.47	42.50	1.4146	82.92	68.73
16.75	1.1306	26.12	21.70	29.75	1.2582	51.64	40.89	42.75	1.4181	83.62	69.52
17.00	1.1328	26.56	22.04	30.00	1.2609	52.18	41.30	43.00	1.4216	84.32	70.33
17.25	1.1350	27.00	22.38	30.25	1.2637	52.74	41.72	43.25	1.4251	85.02	71.15
17.50	1.1373	27.46	22.74	30.50	1.2664	53.28	42.14	43.50	1.4286	85.72	71.98
17.75	1.1395	27.90	23.08	30.75	1.2692	53.84	42.58	43.75	1.4321	86.42	72.82
18.00	1.1417	28.34	23.42	31.00	1.2719	54.38	43.00	44.00	1.4356	87.12	73.67
18.25	1.1440	28.80	23.77	31.25	1.2747	54.94	43.44	44.25	1.4392	87.84	74.53
18.50	1.1462	29.24	24.11	31.50	1.2775	55.50	43.89	44.50	1.4428	88.56	75.40
18.75	1.1485	29.70	24.47	31.75	1.2804	56.08	44.34	44.75	1.4464	89.28	76.28
19.00	1.1508	30.16	24.82	32.00	1.2832	56.64	44.78	45.00	1.4500	90.00	77.17
19.25	1.1531	30.62	25.18	32.25	1.2861	57.22	45.24	45.25	1.4536	90.72	78.07
19.50	1.1554	31.08	25.53	32.50	1.2889	57.78	45.68	45.50	1.4573	91.46	79.03
19.75	1.1577	31.54	25.88	32.75	1.2918	58.36	46.14	45.75	1.4610	92.20	80.04
20.00	1.1600	32.00	26.24	33.00	1.2946	58.92	46.58	46.00	1.4646	92.92	81.08
20.25	1.1624	32.48	26.61	33.25	1.2975	59.50	47.04	46.25	1.4684	93.68	82.18
20.50	1.1647	32.94	26.96	33.50	1.3004	60.08	47.49	46.50	1.4721	94.42	83.33
20.75	1.1671	33.42	27.33	33.75	1.3034	60.68	47.95	46.75	1.4758	95.16	84.48
21.00	1.1694	33.88	27.67	34.00	1.3063	61.26	48.42	47.00	1.4796	95.92	85.70
21.25	1.1718	34.36	28.02	34.25	1.3093	61.86	48.90	47.25	1.4834	96.68	86.98
21.50	1.1741	34.82	28.36	34.50	1.3122	62.44	49.35	47.50	1.4872	97.44	88.32
21.75	1.1765	35.30	28.72	34.75	1.3152	63.04	49.83	47.75	1.4910	98.20	89.76
22.00	1.1789	35.78	29.07	35.00	1.3182	63.64	50.32	48.00	1.4948	98.96	91.35
22.25	1.1813	36.26	29.43	35.25	1.3212	64.24	50.81	48.25	1.4987	99.74	93.13
22.50	1.1837	36.74	29.78	35.50	1.3242	64.84	51.30	48.50	1.5026	100.52	95.11
22.75	1.1861	37.22	30.14	35.75	1.3273	65.46	51.80				

Specific Gravity determinations were made at 60° F., compared with water at 60° F.

From the Specific Gravities, the corresponding degrees Baumé were calculated by the following formula:

$$\text{Baumé} = 145 - \frac{145}{\text{Sp. Gr.}}$$

Baumé Hydrometers for use with this table must be graduated by the above formula, which formula should always be printed on the scale.

Atomic weights from F. W. Clarke's table of 1901. O = 16.

ALLOWANCE FOR TEMPERATURE:

At 10°—20° Be. — 1/30° Be. or .00029 Sp. Gr. = 1° F.
20°—30° Be. — 1/23° Be. or .00044 " " = 1° F.
30°—40° Be. — 1/20° Be. or .00060 " " = 1° F.
40°—48.5° Be. — 1/17° Be. or .00084 " " = 1° F.

AUTHORITY—W. C. FERGUSON.

This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

EXECUTIVE COMMITTEE.

A. G. ROSENGARTEN, *Chairman*, HENRY HOWARD, WM. H. BOWER, W. D. HUNTINGTON, C. W. MILLARD, H. A. GALT, H. F. ATHERTON, SALMON W. WILDER, H. L. DERBY, DR. CHARLES L. REESE, PHILLIP SCHLEUSSER. New York, June 2, 1926.

Courtesy the Manufacturing Chemists' Association of the United States.

Aqua Ammonia

Bé°	Sp. Gr.	%NH_3	Bé°	Sp. Gr.	%NH_3	Bé°	Sp. Gr.	%NH_3
10.00	1.0000	.00	16.50	.9556	11.18	23.00	.9150	23.52
10.25	.9982	.40	16.75	.9540	11.64	23.25	.9135	24.01
10.50	.9964	.80	17.00	.9524	12.10	23.50	.9121	24.50
10.75	.9947	1.21	17.25	.9508	12.56	23.75	.9106	24.99
11.00	.9929	1.62	17.50	.9492	13.02	24.00	.9091	25.48
11.25	.9912	2.04	17.75	.9475	13.49	24.25	.9076	25.97
11.50	.9894	2.46	18.00	.9459	13.96	24.50	.9061	26.46
11.75	.9876	2.88	18.25	.9444	14.43	24.75	.9047	26.95
12.00	.9859	3.30	18.50	.9428	14.90	25.00	.9032	27.44
12.25	.9842	3.73	18.75	.9412	15.37	25.25	.9018	27.93
12.50	.9825	4.16	19.00	.9396	15.84	25.50	.9003	28.42
12.75	.9807	4.59	19.25	.9380	16.32	25.75	.8989	28.91
13.00	.9790	5.02	19.50	.9365	16.80	26.00	.8974	29.40
13.25	.9773	5.45	19.75	.9349	17.28	26.25	.8960	29.89
13.50	.9756	5.88	20.00	.9333	17.76	26.50	.8946	30.38
13.75	.9739	6.31	20.25	.9318	18.24	26.75	.8931	30.87
14.00	.9722	6.74	20.50	.9302	18.72	27.00	.8917	31.36
14.25	.9705	7.17	20.75	.9287	19.20	27.25	.8903	31.85
14.50	.9689	7.61	21.00	.9272	19.68	27.50	.8889	32.34
14.75	.9672	8.05	21.25	.9256	20.16	27.75	.8875	32.83
15.00	.9655	8.49	21.50	.9241	20.64	28.00	.8861	33.32
15.25	.9639	8.93	21.75	.9226	21.12	28.25	.8847	33.81
15.50	.9622	9.38	22.00	.9211	21.60	28.50	.8833	34.30
15.75	.9605	9.83	22.25	.9195	22.08	28.75	.8819	34.79
16.00	.9589	10.28	22.50	.9180	22.56	29.00	.8805	35.28
16.25	.9573	10.73	22.75	.9165	23.04			

Specific Gravity determinations were made at 60° F., compared with water at 60° F.

From the Specific Gravities the corresponding degrees Baumé were calculated by the following formula:

$$\text{Baumé} = \frac{140}{\text{Sp. Gr.}} - 130.$$

Baumé Hydrometers for use with this table must be graduated by the above formula, which formula should always be printed on the scale.

Atomic weights from F. W. Clarke's table of 1901. O = 16.

ALLOWANCE FOR TEMPERATURE.

The coefficient of expansion for Ammonia Solutions, varying with the temperature, correction must be applied according to the following table:

Corrections to be added for each degree below 60° F.			Corrections to be subtracted for each degree above 60° F.			
Degrees Baumé	40° F.	50° F.	70° F.	80° F.	90° F.	100° F.
14°	.015° Bé.	.017° Bé.	.020° Bé.	.022° Bé.	.024° Bé.	.026° Bé.
16°	.021 "	.023 "	.026 "	.028 "	.030 "	.032 "
18°	.027 "	.029 "	.031 "	.033 "	.035 "	.037 "
20°	.033 "	.036 "	.037 "	.038 "	.040 "	.042 "
22°	.039 "	.042 "	.043 "	.045 "	.047 "	
26°	.053 "	.057 "	.057 "	.059 "		

AUTHORITY — W. C. FERGUSON.

This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

W. H. BOWER,
HENRY HOWARD,
JAS. L. MORGAN,
ARTHUR WYMAN,
A. G. ROSENGARTEN,
Executive Committee.

New York, May 14, 1903.

Courtesy the Manufacturing Chemists' Association of the United States.

Zinc Chloride Solution

Bé°	Sp. Gr.	% $ZnCl_2$	Weight of 1 cu. ft. in lbs.	Lbs. $ZnCl_2$ in 1 cu. ft.	% 50% $ZnCl_2$	Lbs. 50% $ZnCl_2$ in 1 cu. ft.
0	1.0000	0	62.37	0	0	0
1	1.0069	.76	62.80	.4773	1.52	.9546
2	1.0140	1.53	63.24	.9676	3.06	1.9352
3	1.0211	2.29	63.69	1.4585	4.58	2.9170
4	1.0284	3.05	64.14	1.9563	6.10	3.9126
5	1.0357	3.81	64.60	2.4613	7.62	4.9226
6	1.0432	4.63	65.06	3.0123	9.26	6.0246
7	1.0507	5.45	65.53	3.5714	10.90	7.1428
8	1.0584	6.27	66.01	4.1388	12.54	8.2776
9	1.0662	7.09	66.50	4.7149	14.18	9.4298
10	1.0741	7.91	66.99	5.2989	15.82	10.5978
11	1.0821	8.78	67.49	5.9256	17.56	11.8512
12	1.0902	9.65	68.00	6.5620	19.30	13.1240
13	1.0985	10.52	68.51	7.2073	21.04	14.4146
14	1.1069	11.39	69.04	7.8637	22.78	15.7274
15	1.1154	12.26	69.57	8.5293	24.52	17.0586
16	1.1240	13.21	70.10	9.2602	26.42	18.5204
17	1.1328	14.15	70.65	9.9970	28.30	19.9940
18	1.1417	15.10	71.21	10.7527	30.20	21.5054
19	1.1508	16.04	71.78	11.5135	32.08	23.0270
20	1.1600	16.98	72.35	12.2850	33.96	24.5700
21	1.1694	17.96	72.94	13.1000	35.92	26.2000
22	1.1789	18.94	73.53	13.9266	37.88	27.8532
23	1.1885	19.92	74.13	14.7667	39.84	29.5334
24	1.1983	20.90	74.74	15.6207	41.80	31.2414
25	1.2083	21.88	75.36	16.4888	43.76	32.9776
26	1.2185	22.88	76.00	17.3888	45.76	34.7776
27	1.2288	23.88	76.64	18.3016	47.76	36.6032
28	1.2393	24.89	77.30	19.2400	49.78	38.4800
29	1.2500	25.89	77.96	20.1838	51.78	40.3676
30	1.2609	26.90	78.64	21.1542	53.80	42.3084
31	1.2719	27.91	79.33	22.1410	55.82	44.2820
32	1.2832	28.91	80.03	23.1367	57.82	46.2734
33	1.2946	29.92	80.74	24.1574	59.84	48.3148
34	1.3063	30.93	81.47	25.1987	61.86	50.3974
35	1.3182	31.93	82.22	26.2528	63.86	52.5056
36	1.3303	32.94	82.97	27.3303	65.88	54.6606
37	1.3426	33.95	83.74	28.4297	67.90	56.8594
38	1.3551	34.96	84.52	29.5482	69.92	59.0964
39	1.3679	35.97	85.32	30.6896	71.94	61.3792
40	1.3810	36.98	86.13	31.8509	73.96	63.7018
41	1.3942	38.02	86.96	33.0622	76.04	66.1244
42	1.4078	39.05	87.80	34.2859	78.10	68.5718
43	1.4216	40.09	88.67	35.5478	80.18	71.0956
44	1.4356	41.12	89.54	36.8188	82.24	73.6376
45	1.4500	42.16	90.44	38.1295	84.32	76.2590
46	1.4646	43.21	91.35	39.4723	86.42	78.9446
47	1.4796	44.26	92.28	40.8431	88.52	81.6862
48	1.4948	45.32	93.23	42.2518	90.64	84.5036
49	1.5104	46.37	94.20	43.6805	92.74	87.3610
50	1.5263	47.43	95.20	45.1534	94.86	90.3068
51	1.5426	48.48	96.21	46.6426	96.96	93.2852
52	1.5591	49.54	97.24	48.1727	99.08	96.3454
53	1.5761	50.60	98.30	49.7398	101.20	99.4796
54	1.5934	51.66	99.38	51.3397	103.32	102.6794
55	1.6111	52.72	100.48	52.9731	105.44	105.9462
56	1.6292	53.80	101.61	54.6662	107.60	109.3324
57	1.6477	54.88	102.77	56.4002	109.76	112.8004
58	1.6667	55.97	103.95	58.1808	111.94	116.3616
59	1.6860	57.06	105.16	60.0043	114.12	120.0086
60	1.7059	58.15	106.40	61.8716	116.30	123.7432
61	1.7262	59.23	107.66	63.7670	118.46	127.5340
62	1.7470	60.30	108.96	65.7029	120.60	131.4058
63	1.7683	61.37	110.29	67.6850	122.74	135.3700
64	1.7901	62.44	111.65	69.7143	124.88	139.4286
65	1.8125	63.52	113.05	71.8094	127.04	143.6188
66	1.8354	64.68	114.47	74.0392	129.36	148.0784
67	1.8590	65.85	115.95	76.3531	131.70	152.7062
68	1.8831	67.02	117.45	78.7150	134.04	157.4300
69	1.9079	68.19	119.00	81.1461	136.38	162.2922
70	1.9333	69.36	120.58	83.6343	138.72	167.2686

APPROXIMATE
ALLOWANCE FOR
TEMPERATURE

At 5° Bé = 0.024° Bé
" 10° " = 0.029° "
" 15° " = 0.029° "
" 20° " = 0.033° "
" 25° " = 0.033° "
" 30° " = 0.033° "
" 35° " = 0.033° "
" 40° " = 0.033° "
" 45° " = 0.033° "
" 50° " = 0.030° "
" 55° " = 0.028° "
" 60° " = 0.027° "
" 65° " = 0.027° "
" 70° " = 0.024° "

For each 1° Fahrenheit

*FIXED POINTS

Bé°	Sp. Gr.	Percent $ZnCl_2$
5.08	1.0363	3.88
10.16	1.0754	8.05
15.35	1.1184	12.59
20.35	1.1633	17.32
25.14	1.1707	22.02
30.00	1.2609	26.90
35.07	1.3190	32.00
40.15	1.3829	37.14
44.99	1.4499	42.15
50.14	1.5285	47.58
55.05	1.6120	52.77
60.13	1.7085	58.29
65.11	1.8150	63.65
70.05	1.9345	69.42

Specific gravity determinations were made at 60° F., compared with water at 60° F., on solutions of Zinc Chloride made from chemically pure zinc and Hydrochloric Acid, these solutions exhibiting a neutral reaction to methyl orange when diluted below 5° Bé with water.

The corresponding degrees Baumé were calculated from the Specific Gravities by the following formula:

$$\text{Baumé} = 145 - \frac{145}{\text{Sp. Gr.}}$$

Baumé Hydrometers for use with this table must be graduated by the above formula, which formula should always be printed on the scale.

1 cubic foot of water weighs 62.37 lbs. Av.
Atomic weights used: — F. W. Clarke's table of 1912. O = 16

* The percentage composition on all fixed points were determined by actual chemical analysis both Zinc and Chlorine being determined.

Authorities: H. W. Whitney, E. H. Hartle, C. H. Sakryd.

Checked by: L. C. Drefahl, R. M. Meiklejohn, R. O. Fernandez.

This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

Henry Howard, Chairman
Dr. Chas. L. Reese
Adolph G. Rosengarten
Lancaster Morgan
C. Wilbur Miller
Salmon W. Wilder
H. H. Dow
Thomas M. Rianhard
Robert T. Baldwin
Executive Committee

Courtesy the Manufacturing Chemists' Association of the United States.

Aluminum Sulfate

SPECIFIC GRAVITY OF ALUMINUM SULFATE SOLUTIONS 15° C. (LARSSON)
Alum-maker's Table

Bé.	Sp. gr.	100 kg. of solution contain					100 liters of solution contain				
		Kg. Al_2O_3	Kg. SO_3	Kg. sulfate with 13 per cent Al_2O_3	Kg. sulfate with 14 per cent Al_2O_3	Kg. sulfate with 15 per cent Al_2O_3	Kg. Al_2O_3	Kg. SO_3	Kg. sulfate with 13 per cent Al_2O_3	Kg. sulfate with 14 per cent Al_2O_3	Kg.sulfate with 15per cent Al_2O_3
0.7	1.005	0.14	0.32	1.1	1.0	0.9	0.14	0.33	1.1	1	0.9
1.4	1.010	0.27	0.64	2.1	2.0	1.8	0.28	0.65	2.2	2	1.9
2.3	1.016	0.41	0.95	3.1	2.9	2.7	0.42	0.98	3.2	3	2.8
3.0	1.021	0.55	1.27	4.2	3.9	3.6	0.56	1.31	4.3	4	3.7
3.7	1.026	0.68	1.59	5.3	4.9	4.6	0.70	1.63	5.4	5	4.7
4.4	1.031	0.81	1.89	6.3	5.8	5.4	0.84	1.96	6.5	6	5.6
5.0	1.036	0.94	2.20	7.3	6.7	6.3	0.98	2.28	7.5	7	6.5
5.6	1.040	1.07	2.50	8.3	7.7	7.2	1.12	2.61	8.6	8	7.5
6.2	1.045	1.20	2.80	9.3	8.6	8.0	1.26	2.94	9.7	9	8.4
6.9	1.050	1.33	3.11	10.3	9.5	8.9	1.40	3.26	10.8	10	9.3
7.6	1.055	1.46	3.40	11.2	10.4	9.7	1.54	3.59	11.8	11	10.3
8.1	1.059	1.58	3.69	12.2	11.3	10.6	1.68	3.91	12.9	12	11.2
8.7	1.064	1.71	3.98	13.1	12.2	11.4	1.82	4.24	14.0	13	12.1
9.2	1.068	1.83	4.27	14.1	13.1	12.2	1.96	4.57	15.1	14	13.1
9.9	1.073	1.96	4.56	15.1	14.0	13.1	2.10	4.89	16.2	15	14.0
10.5	1.078	2.08	4.84	16.0	14.8	13.9	2.24	5.22	17.2	16	14.9
11.0	1.082	2.20	5.12	16.9	15.7	14.6	2.38	5.55	18.3	17	15.9
11.6	1.087	2.32	5.40	17.8	16.5	15.4	2.52	5.87	19.4	18	16.8
12.2	1.092	2.44	5.67	18.7	17.4	16.2	2.66	6.20	20.5	19	17.7
12.7	1.096	2.55	5.95	19.6	18.3	17.0	2.80	6.52	21.5	20	18.7
13.3	1.101	2.67	6.22	20.5	19.1	17.8	2.94	6.85	22.6	21	19.6
13.8	1.105	2.78	6.49	21.4	19.9	18.6	3.08	7.18	23.7	22	20.5
14.4	1.110	2.90	6.76	22.3	20.7	19.3	3.22	7.50	24.8	23	21.5
14.8	1.114	3.01	7.02	23.2	21.5	20.1	3.36	7.83	25.9	24	22.4
15.4	1.119	3.13	7.29	24.1	22.4	20.9	3.50	8.16	26.9	25	23.3
15.9	1.123	3.24	7.55	24.9	23.1	21.6	3.64	8.48	28.0	26	24.3
16.5	1.128	3.35	7.81	25.8	23.9	22.3	3.78	8.81	29.1	27	25.2
16.9	1.132	3.46	8.06	26.6	24.7	23.1	3.92	9.13	30.2	28	26.1
17.5	1.137	3.57	8.32	27.5	25.5	23.8	4.06	9.46	31.2	29	27.1
17.9	1.141	3.68	8.58	28.3	26.3	24.5	4.20	9.79	32.3	30	28.0
18.4	1.145	3.79	8.83	29.1	27.1	25.3	4.34	10.11	33.4	31	28.9
18.9	1.150	3.89	9.07	30.0	27.8	26.0	4.48	10.44	34.5	32	29.9
19.4	1.154	4.00	9.32	30.8	28.6	26.7	4.64	10.76	35.5	33	30.8
19.9	1.159	4.11	9.57	31.6	29.3	27.4	4.76	11.09	36.6	34	31.7
20.3	1.163	4.21	9.82	32.4	30.1	28.1	4.90	11.42	37.7	35	32.7
20.9	1.168	4.32	10.06	33.2	30.8	28.9	5.04	11.74	38.8	36	33.6
21.3	1.172	4.42	10.29	34.0	31.6	29.5	5.18	12.07	39.9	37	34.5
21.7	1.176	4.52	10.53	34.8	32.3	30.1	5.32	12.40	40.9	38	35.5

From Hodgman and Lange, Handbook of Chemistry and Physics, courtesy Chemical Rubber Publishing Co.

Glycerol

Specific Gravity of Aqueous Glycerol (Glycerin) Solutions at $\frac{20^\circ}{4^\circ}$ C.

Bé	Sp. gr.	Per cent $C_3H_8O_3$	G. per liter	Lbs. per cu. ft.	Lbs. per gal.
....	0.9982	0	....	....	....
0.1	1.0006	1	10.01	0.6246	0.0835
0.4	1.0030	2	20.06	1.252	0.1674
0.8	1.0053	3	30.16	1.883	0.2517
1.1	1.0077	4	40.31	2.516	0.3364
1.5	1.0101	5	50.51	3.153	0.4215
1.8	1.0125	6	60.75	3.792	0.5070
2.1	1.0149	7	71.04	4.435	0.5929
2.5	1.0173	8	81.38	5.081	0.6792
2.8	1.0197	9	91.77	5.729	0.7659
3.1	1.0221	10	102.2	6.381	0.8530
3.5	1.0246	11	112.7	7.036	0.9406
3.8	1.0271	12	123.3	7.694	1.029
4.1	1.0295	13	133.8	8.355	1.117
4.5	1.0320	14	144.5	9.019	1.206
4.8	1.0345	15	155.2	9.687	1.295
5.2	1.0370	16	165.9	10.36	1.385
5.5	1.0395	17	176.7	11.03	1.475
5.8	1.0420	18	187.6	11.71	1.565
6.2	1.0445	19	198.5	12.39	1.656
6.5	1.0470	20	209.4	13.07	1.747
6.8	1.0495	21	220.4	13.76	1.839
7.2	1.0520	22	231.4	14.45	1.931
7.5	1.0545	23	242.5	15.14	2.024
7.8	1.0571	24	253.7	15.84	2.117
8.2	1.0597	25	264.9	16.54	2.211
8.5	1.0622	26	276.2	17.24	2.305
8.8	1.0648	27	287.5	17.95	2.399
9.2	1.0674	28	298.9	18.66	2.494
9.5	1.0700	29	310.3	19.37	2.590
9.8	1.0727	30	321.8	20.09	2.686
10.2	1.0753	31	333.3	20.81	2.782
10.5	1.0780	32	345.0	21.53	2.879
10.8	1.0806	33	356.6	22.26	2.976
11.2	1.0833	34	368.3	22.99	3.074
11.5	1.0860	35	380.1	23.73	3.172
11.8	1.0887	36	391.9	24.47	3.271
12.1	1.0914	37	403.8	25.21	3.370
12.5	1.0941	38	415.8	25.95	3.470
12.8	1.0968	39	427.8	26.70	3.570
13.1	1.0995	40	439.8	27.46	3.670
13.4	1.1022	41	451.9	28.21	3.771
13.8	1.1049	42	464.1	28.97	3.873
14.1	1.1075	43	476.2	29.73	3.974
14.4	1.1102	44	488.5	30.49	4.077
14.7	1.1128	45	500.8	31.26	4.179
15.0	1.1155	46	513.1	32.03	4.282
15.3	1.1182	47	525.6	32.81	4.386
15.6	1.1209	48	538.0	33.59	4.490
16.0	1.1236	49	550.6	34.37	4.595
16.3	1.1263	50	563.2	35.16	4.700
16.6	1.1290	51	575.8	35.94	4.805
16.9	1.1317	52	588.5	36.74	4.911
17.2	1.1344	53	601.2	37.53	5.017
17.5	1.1371	54	614.0	38.33	5.124
17.8	1.1398	55	626.9	39.13	5.232
18.1	1.1425	56	639.8	39.94	5.339
18.4	1.1452	57	652.8	40.75	5.447
18.7	1.1479	58	665.8	41.56	5.556
19.0	1.1506	59	678.9	42.38	5.665
19.3	1.1533	60	692.0	43.20	5.775
19.6	1.1560	61	705.2	44.02	5.885
19.9	1.1587	62	718.4	44.85	5.995
20.2	1.1614	63	731.7	45.68	6.106
20.5	1.1642	64	745.1	46.51	6.218
20.8	1.1670	65	758.6	47.35	6.330
21.0	1.1697	66	772.0	48.19	6.443
21.3	1.1724	67	785.5	49.04	6.555
21.6	1.1752	68	799.1	49.89	6.669
21.9	1.1780	69	812.8	50.74	6.783
22.2	1.1808	70	826.6	51.60	6.898
22.5	1.1836	71	840.4	52.46	7.013
22.8	1.1863	72	854.1	53.32	7.128
23.1	1.1890	73	868.0	54.18	7.243
23.3	1.1917	74	881.9	55.05	7.359
23.6	1.1944	75	895.8	55.92	7.476
23.9	1.1971	76	909.8	56.80	7.592
24.2	1.1998	77	923.8	57.67	7.710
24.4	1.2025	78	938.0	58.55	7.827
24.7	1.2052	79	952.1	59.44	7.945
25.0	1.2079	80	966.3	60.32	8.064
25.2	1.2106	81	980.6	61.22	8.183
25.5	1.2133	82	994.9	62.11	8.303
25.8	1.2160	83	1009	63.01	8.423
26.0	1.2187	84	1024	63.91	8.543
26.3	1.2214	85	1038	64.81	8.664
26.5	1.2241	86	1053	65.72	8.785
26.8	1.2268	87	1067	66.63	8.907
27.1	1.2294	88	1082	67.54	9.028
27.3	1.2320	89	1096	68.45	9.150
27.6	1.2347	90	1111	69.37	9.273
27.8	1.2374	91	1126	70.29	9.397
28.1	1.2401	92	1141	71.22	9.521
28.3	1.2428	93	1156	72.15	9.645
28.6	1.2455	94	1171	73.09	9.770
28.8	1.2482	95	1186	74.03	9.896
29.1	1.2508	96	1201	74.96	10.02
29.3	1.2534	97	1216	75.90	10.15
29.5	1.2559	98	1231	76.83	10.27
29.8	1.2584	99	1246	77.77	10.40
30.0	1.2609	100	1261	78.71	10.52

From Hodgman and Lange, Handbook of Chemistry and Physics, courtesy Chemical Rubber Publishing Co.

Sodium Carbonate, 15° C. (59° F.) Lunge

Specific Gravity	Degrees Baumé	Degrees Twaddell	Percent Na_2CO_3	Percent Na_2O	One Gallon Contains	
					Pounds Na_2CO_3	Pounds Na_2O
1.007	1.0	1.4	0.67	0.39	.056	.033
1.014	2.0	2.8	1.33	0.78	.113	.066
1.022	3.1	4.4	2.09	1.22	.178	.104
1.029	4.1	5.8	2.76	1.61	.237	.138
1.036	5.1	7.2	3.43	2.01	.297	.174
1.045	6.2	9.0	4.29	2.51	.374	.219
1.052	7.2	10.4	4.94	2.89	.434	.254
1.060	8.2	12.0	5.71	3.34	.505	.295
1.067	9.1	13.4	6.37	3.73	.567	.332
1.075	10.1	15.0	7.12	4.16	.639	.373
1.083	11.1	16.6	7.88	4.61	.712	.417
1.091	12.1	18.2	8.62	5.04	.785	.459
1.100	13.2	20.0	9.43	5.52	.866	.507
1.108	14.1	21.6	10.19	5.96	.942	.551
1.116	15.1	23.2	10.95	6.41	1.020	.597
1.125	16.1	25.0	11.81	6.91	1.109	.649
1.134	17.1	26.8	12.61	7.38	1.193	.698
1.142	18.0	28.4	13.16	7.70	1.254	.734
1.152	19.1	30.4	14.24	8.33	1.369	.801

Courtesy Diamond Alkali Co.

Caustic Soda, 15° C. (59° F.) Lunge

Specific Gravity	Degrees Baumé	Degrees Twaddell	Percent NaOH	Percent Na_2O	One Gallon Contains	
					Pounds NaOH	Pounds Na_2O
1.007	1.0	1.4	0.61	0.47	0.051	0.039
1.014	2.0	2.8	1.20	0.93	0.101	0.079
1.022	3.1	4.4	2.00	1.55	0.170	0.132
1.029	4.1	5.8	2.70	2.10	0.232	0.180
1.036	5.1	7.2	3.35	2.60	0.289	0.225
1.045	6.2	9.0	4.00	3.10	0.345	0.268
1.052	7.2	10.4	4.64	3.60	0.407	0.316
1.060	8.2	12.0	5.29	4.10	0.467	0.362
1.067	9.1	13.4	5.87	4.55	0.522	0.405
1.075	10.1	15.0	6.55	5.08	0.587	0.455
1.083	11.1	16.6	7.31	5.67	0.660	0.512
1.091	12.1	18.2	8.00	6.20	0.728	0.564
1.100	13.2	20.0	8.68	6.73	0.796	0.617
1.108	14.1	21.6	9.42	7.30	0.870	0.674
1.116	15.1	23.2	10.06	7.80	0.936	0.726
1.125	16.1	25.0	10.97	8.50	1.029	0.797
1.134	17.1	26.8	11.84	9.18	1.119	0.868
1.142	18.0	28.4	12.64	9.80	1.203	0.933
1.152	19.1	30.4	13.55	10.50	1.301	1.008
1.162	20.2	32.4	14.37	11.14	1.392	1.079
1.171	21.2	34.2	15.13	11.73	1.477	1.145
1.180	22.1	36.0	15.91	12.33	1.565	1.213
1.190	23.1	38.0	16.77	13.00	1.664	1.290
1.200	24.2	40.0	17.67	13.70	1.768	1.371
1.210	25.2	42.0	18.58	14.40	1.874	1.453
1.220	26.1	44.0	19.58	15.18	1.992	1.544
1.231	27.2	46.2	20.59	15.96	2.113	1.638
1.241	28.2	48.2	21.42	16.76	2.216	1.734
1.252	29.2	50.4	22.64	17.55	2.363	1.832
1.263	30.2	52.6	23.67	18.35	2.492	1.932
1.274	31.2	54.8	24.81	19.23	2.635	2.042
1.285	32.2	57.0	25.80	20.00	2.764	2.143
1.297	33.2	59.4	26.83	20.80	2.901	2.249
1.308	34.1	61.6	27.80	21.55	3.032	2.350
1.320	35.2	64.0	28.83	22.35	3.173	2.460
1.332	36.1	66.4	29.93	23.20	3.324	2.576
1.345	37.2	69.0	31.22	24.20	3.501	2.714
1.357	38.1	71.4	32.47	25.17	3.673	2.848
1.370	39.2	74.0	33.69	26.12	3.848	2.983
1.383	40.2	76.6	34.96	27.10	4.031	3.125
1.397	41.2	79.4	36.25	28.10	4.222	3.273
1.410	42.2	82.0	37.47	29.05	4.405	3.415
1.424	43.2	84.8	38.80	30.08	4.606	3.571
1.438	44.2	87.6	39.99	31.00	4.794	3.716
1.453	45.2	90.6	41.41	32.10	5.016	3.888
1.468	46.2	93.6	42.83	33.20	5.242	4.063
1.483	47.2	96.6	44.38	34.40	5.487	4.253
1.498	48.2	99.6	46.15	35.70	5.764	4.459
1.514	49.2	102.8	47.60	36.90	6.008	4.658
1.530	50.2	106.0	49.02	38.00	6.253	4.847

Courtesy Diamond Alkali Co.

Crystallization Temperatures of Caustic Soda Solutions

Specific Gravity	Degrees Baumé	Percent NaOH	Percent Na_2O	Saturation Temperature ° F.
1.191	23.3	16.8	13.0	− 13.0
1.237	27.8	21.1	16.4	− 5.8
1.278	31.5	25.2	19.5	1.4
1.306	34.0	27.6	21.4	6.8
1.358	38.2	32.5	25.2	24.8
1.464	46.0	42.4	32.9	34.7
1.491	47.8	45.3	35.1	41.0

Courtesy Diamond Alkali Co.

For Use in Converting From One to the Other of the Systems Used to Express the Alkalinity of Soda Ash and Caustic Soda

Soda Ash Sodium Carbonate (Percent Na_2CO_3)	Caustic Soda Sodium Hydroxide (Percent NaOH)	Actual Alkali Sodium Oxide (Percent Na_2O)	N. Y. & L. Test Sodium Oxide (Percent Na_2O)	Newcastle Test* Sodium Oxide (Percent Na_2O)
82.07	....	48.00	49.55	48.63
83.78	....	49.00	50.58	49.64
85.48	....	50.00	51.61	50.66
87.19	....	51.00	52.64	51.67
88.90	....	52.00	53.68	52.68
90.61	....	53.00	54.71	53.70
92.32	....	54.00	55.74	54.71
94.03	....	55.00	56.77	55.72
95.74	....	56.00	57.81	56.74
97.45	....	57.00	58.84	57.75
99.16	....	58.00	59.87	58.76
100.00	....	58.49	60.38	59.27
....	77.42	60.00	61.94	60.79
....	78.71	61.00	62.97	61.80
....	80.00	62.00	64.00	62.82
....	81.29	63.00	65.03	63.83
....	82.58	64.00	66.06	64.84
....	83.87	65.00	67.10	65.85
....	85.16	66.00	68.13	66.87
....	86.45	67.00	69.16	67.88
....	87.74	68.00	70.19	68.89
....	89.03	69.00	71.23	69.91
....	90.32	70.00	72.26	70.92
....	91.61	71.00	73.29	71.93
....	92.90	72.00	74.32	72.95
....	94.19	73.00	75.35	73.96
....	95.48	74.00	76.39	74.97
....	96.77	75.00	77.42	75.99
....	98.06	76.00	78.45	77.00
....	99.35	77.00	79.48	78.01
....	100.00	77.50	80.00	78.52

* Newcastle Test from Lunge's Technical Chemists' Handbook.

Courtesy Diamond Alkali Co.

Methyl Alcohol

SPECIFIC GRAVITY OF MIXTURES OF METHYL ALCOHOL AND WATER BY VOLUME AND BY WEIGHT

Giving the specific gravity at 15.6° C. referred to water at the same temperature. To reduce to specific gravity of water at 4° C. multiply by 0.99908.

(Techn. Hogskolan, Stockholm.)

Specific Gravity	Per cent Alcohol by Weight	Per cent Alcohol by Volume	Specific Gravity	Per cent Alcohol by Weight	Per cent Alcohol by Volume	Specific Gravity	Per cent Alcohol by Weight	Per cent Alcohol by Volume
1.0000	0.00	0.00	0.9941	3.24	4.13	0.9882	6.86	8.52
0.9999	0.06	0.07	0.9940	3.30	4.20	0.9881	6.93	8.59
0.9998	0.11	0.13	0.9939	3.36	4.27	0.9880	6.99	8.67
0.9997	0.17	0.20	0.9938	3.42	4.35	0.9879	7.06	8.75
0.9996	0.22	0.27	0.9937	3.48	4.42	0.9878	7.12	8.83
0.9995	0.28	0.33	0.9936	3.53	4.49	0.9877	7.19	8.90
0.9994	0.33	0.40	0.9935	3.59	4.57	0.9876	7.25	8.98
0.9993	0.39	0.47	0.9934	3.65	4.64	0.9875	7.32	9.06
0.9992	0.44	0.53	0.9933	3.71	4.71	0.9874	7.38	9.14
0.9991	0.50	0.60	0.9932	3.77	4.79	0.9873	7.45	9.22
0.9990	0.55	0.67	0.9931	3.83	4.89	0.9872	7.51	9.29
0.9989	0.61	0.73	0.9930	3.89	4.94	0.9871	7.58	9.37
0.9988	0.66	0.80	0.9929	3.94	5.01	0.9870	7.64	9.45
0.9987	0.72	0.86	0.9928	4.00	5.08	0.9869	7.71	9.53
0.9986	0.77	0.93	0.9927	4.06	5.16	0.9868	7.77	9.61
0.9985	0.83	1.00	0.9926	4.12	5.23	0.9867	7.84	9.68
0.9984	0.88	1.06	0.9925	4.18	5.30	0.9866	7.90	9.76
0.9983	0.94	1.13	0.9924	4.24	5.38	0.9865	7.97	9.84
0.9982	0.99	1.20	0.9923	4.29	5.45	0.9864	8.03	9.92
0.9981	1.05	1.26	0.9922	4.35	5.52	0.9863	8.10	10.00
0.9980	1.10	1.33	0.9921	4.41	5.60	0.9862	8.16	10.07
0.9979	1.15	1.40	0.9920	4.57	5.67	0.9861	8.23	10.15
0.9978	1.20	1.47	0.9919	4.53	5.74	0.9860	8.29	10.23
0.9977	1.26	1.54	0.9918	4.60	5.82	0.9859	8.35	10.31
0.9976	1.31	1.62	0.9917	4.66	5.89	0.9858	8.42	10.38
0.9975	1.36	1.69	0.9916	4.72	5.96	0.9857	8.48	10.47
0.9974	1.41	1.76	0.9915	4.78	6.04	0.9856	8.55	10.55
0.9973	1.46	1.83	0.9914	4.85	6.11	0.9855	8.61	10.63
0.9972	1.52	1.90	0.9913	4.91	6.18	0.9854	8.68	10.71
0.9971	1.57	1.97	0.9912	4.97	6.25	0.9853	8.74	10.79
0.9970	1.62	2.05	0.9911	5.03	6.33	0.9852	8.81	10.87
0.9969	1.67	2.12	0.9910	5.10	6.40	0.9851	8.87	10.95
0.9968	1.72	2.19	0.9909	5.16	6.47	0.9850	8.94	11.03
0.9967	1.78	2.26	0.9908	5.22	6.55	0.9849	9.00	11.10
0.9966	1.83	2.33	0.9907	5.28	6.62	0.9848	9.06	11.18
0.9965	1.88	2.40	0.9906	5.35	6.69	0.9847	9.13	11.26
0.9964	1.93	2.47	0.9905	5.41	6.77	0.9846	9.19	11.34
0.9963	1.98	2.55	0.9904	5.47	6.84	0.9845	9.26	11.42
0.9962	2.04	2.62	0.9903	5.53	6.91	0.9844	9.32	11.50
0.9961	2.09	2.69	0.9902	5.60	6.98	0.9843	9.39	11.58
0.9960	2.14	2.76	0.9901	5.66	7.06	0.9842	9.45	11 66
0.9959	2.20	2.83	0.9900	5.72	7.13	0.9841	9.52	11.74
0.9958	2.26	2.90	0.9899	5.78	7.21	0.9840	9.58	11.82
0.9957	2.31	2.98	0.9898	5.85	7.28	0.9839	9.65	11.90
0.9956	2.37	3.05	0.9897	5.91	7.36	0.9838	9.72	11.98
0.9955	2.43	3.12	0.9896	5.97	7.44	0.9837	9.78	12.06
0.9954	2.49	3.19	0.9895	6.04	7.52	0.9836	9.85	12.14
0.9953	2.55	3.26	0.9894	6.10	7.59	0.9835	9.92	12.23
0.9952	2.60	3.34	0.9893	6.16	7.67	0.9834	9.99	12.31
0.9951	2.66	3.41	0.9892	6.23	7.75	0.9833	10.06	12.39
0.9950	2.72	3.48	0.9891	6.29	7.82	0.9832	10.12	12.47
0.9949	2.78	3.55	0.9890	6.36	7.90	0.9831	10.19	12.55
0.9948	2.84	3.62	0.9889	6.42	7.98	0.9830	10.26	12.63
0.9947	2.89	3.70	0.9888	6.48	8.05	0.9829	10.33	12.71
0.9946	2.95	3.77	0.9887	6.55	8.13	0.9828	10.40	12.79
0.9945	3.01	3.84	0.9886	6.61	8.21	0.9827	10.46	12.87
0.9944	3.07	3.91	0.9885	6.67	8.29	0.9826	10.53	12.95
0.9943	3.13	3.98	0.9884	6.74	8.36	0.9825	10.60	13.04
0.9942	3.18	4.06	0.9883	6.80	8.44	0.9824	10.67	13.12

METHYL ALCOHOL (*Continued*)

SPECIFIC GRAVITY OF MIXTURES OF METHYL ALCOHOL AND WATER BY VOLUME AND BY WEIGHT

Specific Gravity	Per cent Alcohol by Weight	Per cent Alcohol by Volume	Specific Gravity	Per cent Alcohol by Weight	Per cent Alcohol by Volume	Specific Gravity	Per cent Alcohol by Weight	Per cent Alcohol by Volume
0.9823	10.74	13.20	0.9758	15.27	18.70	0.9693	19.87	24.25
0.9822	10.80	13.28	0.9757	15.34	18.79	0.9692	19.94	24.34
0.9821	10.87	13.36	0.9756	15.41	18.88	0.9691	20.01	24.42
0.9820	10.94	13.44	0.9755	15.49	18.96	0.9690	20.09	24.51
0.9819	11.01	13.52	0.9754	15.56	19.05	0.9689	20.16	24.59
0.9818	11.07	13.61	0.9753	15.63	19.14	0.9688	20.23	24.67
0.9817	11.14	13.69	0.9752	15.70	19.22	0.9687	20.30	24.76
0.9816	11.21	13.78	0.9751	15.78	19.31	0.9686	20.37	24.84
0.9815	11.27	13.86	0.9750	15.85	19.40	0.9685	20.44	24.92
0.9814	11.34	13.94	0.9749	15.92	19.48	0.9684	20.51	25.01
0.9813	11.41	14.03	0.9748	16.00	19.56	0.9683	20.58	25.09
0.9812	11.47	14.11	0.9747	16.07	19.65	0.9682	20.65	25.17
0.9811	11.54	14.20	0.9746	16.14	19.74	0.9681	20.72	25.26
0.9810	11.61	14.28	0.9745	16.22	19.83	0.9680	20.79	25.34
0.9809	11.67	14.36	0.9744	16.29	19.91	0.9679	20.86	25.42
0.9808	11.74	14.45	0.9743	16.36	20.00	0.9678	20.93	25.51
0.9807	11.80	14.53	0.9742	16.43	20.09	0.9677	21.00	25.59
0.9806	11.87	14.62	0.9741	16.51	20.17	0.9676	21.07	25.68
0.9805	11.94	14.70	0.9740	16.58	20.26	0.9675	21.14	25.76
0.9804	12.00	14.78	0.9739	16.65	20.35	0.9674	21.21	25.84
0.9803	12.07	14.87	0.9738	16.72	20.43	0.9673	21.28	25.95
0.9802	12.14	14.95	0.9737	16.79	20.52	0.9672	21.33	26.01
0.9801	12.20	15.04	0.9736	16.86	20.60	0.9671	21.42	26.10
0.9800	12.27	15.12	0.9735	16.93	20.69	0.9670	21.49	26.18
0.9799	12.34	15.21	0.9734	17.00	20.77	0.9669	21.56	26.26
0.9798	12.41	15.29	0.9733	17.07	20.86	0.9668	21.63	26.35
0.9797	12.48	15.38	0.9732	17.14	20.94	0.9667	21.70	26.43
0.9796	12.55	15.46	0.9731	17.21	21.03	0.9666	21.77	26.52
0.9795	12.62	15.55	0.9730	17.28	21.11	0.9665	21.84	26.60
0.9794	12.69	15.63	0.9729	17.35	21.20	0.9664	21.91	26.68
0.9793	12.76	15.72	0.9728	17.42	21.28	0.9663	21.98	26.77
0.9792	12.83	15.80	0.9727	17.49	21.37	0.9662	22.05	26.85
0.9791	12.90	15.89	0.9726	17.56	21.45	0.9661	22.12	26.94
0.9790	12.97	15.87	0.9725	17.63	21.54	0.9660	22.19	27.02
0.9789	13.04	16.06	0.9724	17.70	21.62	0.9659	22.26	27.10
0.9788	13.11	16.14	0.9723	17.77	21.71	0.9658	22.52	27.18
0.9787	13.18	16.23	0.9722	17.84	21.79	0.9657	22.40	27.26
0.9786	13.25	16.31	0.9721	17.91	21.88	0.9656	22.47	27.34
0.9785	13.32	16.40	0.9720	17.98	21.96	0.9655	22.54	27.43
0.9784	13.39	16.48	0.9719	18.05	22.05	0.9654	22.61	27.51
0.9783	13.46	16.57	0.9718	18.12	22.13	0.9653	22.68	27.59
0.9782	13.53	16.65	0.9717	18.19	22.22	0.9652	22.75	27.67
0.9781	13.60	16.74	0.9716	18.26	22.30	0.9651	22.82	27.75
0.9780	13.67	16.82	0.9715	18.33	22.39	0.9650	22.89	27.83
0.9779	13.74	16.91	0.9714	18.40	22.47	0.9649	22.96	27.91
0.9778	13.82	16.99	0.9713	18.47	22.56	0.9648	23.03	27.99
0.9777	13.89	17.08	0.9712	18.54	22.64	0.9647	23.10	28.07
0.9776	13.96	17.16	0.9711	18.61	22.73	0.9646	23.17	28.18
0.9775	14.03	17.25	0.9710	18.68	22.82	0.9645	23.24	28.24
0.9774	14.11	17.33	0.9709	18.75	22.90	0.9644	23.31	28.32
0.9773	14.18	17.42	0.9708	18.82	22.99	0.9643	23.38	28.40
0.9772	14.25	17.50	0.9707	18.89	23.07	0.9642	23.45	28.48
0.9771	14.32	17.59	0.9706	18.96	23.16	0.9641	23.52	28.56
0.9770	14.40	17.68	0.9705	19.03	23.24	0.9640	23.59	28.64
0.9769	14.47	17.76	0.9704	19.10	23.33	0.9639	23.66	28.72
0.9768	14.54	17.85	0.9703	19.17	23.41	0.9638	23.75	28.80
0.9767	14.61	17.93	0.9702	19.24	23.50	0.9637	23.80	28.88
0.9766	14.69	18.02	0.9701	19.31	23.58	0.9636	23.88	28.96
0.9765	14.76	18.10	0.9700	19.38	23.67	0.9635	23.95	29.04
0.9764	14.83	18.19	0.9699	19.45	23.75	0.9634	24.02	29.11
0.9763	14.90	18.27	0.9698	19.52	23.84	0.9633	24.09	29.19
0.9762	14.98	18.36	0.9697	19.59	23.92	0.9632	24.16	29.27
0.9761	15.05	18.44	0.9696	19.66	24.00	0.9631	24.23	29.36
0.9760	15.12	18.53	0.9695	19.73	24.09	0.9630	24.31	29.43
0.9759	15.19	18.62	0.9694	19.80	24.17	0.9629	24.38	29.51

From Hodgman and Lange, Handbook of Chemistry and Physics, 13th Edition, courtesy Chemical Rubber Publishing Co.

Methyl Alcohol

SPECIFIC GRAVITY OF MIXTURES OF METHYL ALCOHOL AND WATER BY VOLUME AND BY WEIGHT

Giving the specific gravity at 15° C. referred to water at 4° C.
(Calculated from values by Doroshevski and Rozhdestvenski,
Dittmar and Fawsitt.)

Per cent alcohol by weight	Per cent alcohol by volume	Specific gravity	Per cent alcohol by weight	Per cent alcohol by volume	Specific gravity
1	1.25	0.99727	51	58.74	0.91653
2	2.50	0.99543	52	59.76	0.91451
3	3.75	0.99370	53	60.77	0.91248
4	4.99	0.99198	54	61.78	0.91044
5	6.22	0.99029	55	62.78	0.90839
6	7.45	0.98864	56	63.78	0.90631
7	8.68	0.98701	57	64.77	0.90421
8	9.91	0.98547	58	65.75	0.90210
9	11.13	0.98394	59	66.73	0.89996
10	12.35	0.98241	60	67.69	0.89781
11	13.56	0.98093	61	68.65	0.89563
12	14.77	0.97945	62	69.61	0.89341
13	15.98	0.97802	63	70.55	0.89117
14	17.18	0.97660	64	71.49	0.88890
15	18.38	0.97518	65	72.42	0.88662
16	19.58	0.97377	66	73.34	0.88433
17	20.77	0.97237	67	74.26	0.88203
18	21.96	0.97096	68	75.17	0.87971
19	23.15	0.96955	69	76.08	0.87739
20	24.33	0.96814	70	76.98	0.87507
21	25.51	0.96673	71	77.86	0.87271
22	26.69	0.96533	72	78.75	0.87033
23	27.86	0.96392	73	79.62	0.86792
24	29.03	0.96251	74	80.48	0.86546
25	30.19	0.96108	75	81.34	0.86300
26	31.25	0.95963	76	82.18	0.86051
27	32.51	0.95817	77	83.02	0.85801
28	33.66	0.95668	78	83.86	0.85551
29	34.81	0.95518	79	84.68	0.85300
30	35.95	0.95366	80	85.50	0.85048
31	37.09	0.95213	81	86.31	0.84794
32	38.22	0.95056	82	87.11	0.84536
33	39.35	0.94896	83	87.90	0.84274
34	40.48	0.94734	84	88.68	0.84009
35	41.59	0.94570	85	89.45	0.83742
36	42.71	0.94404	86	90.21	0.83475
37	43.82	0.94237	87	90.97	0.83207
38	44.92	0.94067	88	91.72	0.82937
39	46.02	0.93894	89	92.46	0.82667
40	47.11	0.93720	90	93.19	0.82396
41	48.20	0.93543	91	93.92	0.82124
42	49.28	0.93365	92	94.63	0.81849
43	50.35	0.93185	93	95.33	0.81568
44	51.42	0.93001	94	96.02	0.81285
45	52.49	0.92815	95	96.70	0.80999
46	53.54	0.92627	96	97.37	0.80713
47	54.60	0.92436	97	98.04	0.80428
48	55.64	0.92242	98	98.70	0.80143
49	56.68	0.92048	99	99.35	0.79859
50	57.71	0.91852	100	100.00	0.79577

From Hodgman and Lange, Handbook of Chemistry and Physics, 13th Edition, courtesy Chemical Rubber Publishing Co.

Ethyl Alcohol

SPECIFIC GRAVITY OF AQUEOUS SOLUTIONS REFERRED TO WATER AT THE SAME TEMPERATURE

Per cent alcohol	Sp. gr. $\frac{15^\circ}{15^\circ}$ C.	Sp. gr. $\frac{20^\circ}{20^\circ}$ C.	Sp. gr. $\frac{25^\circ}{25^\circ}$ C.	Per cent alcohol	Sp. gr. $\frac{15^\circ}{15^\circ}$ C.	Sp. gr. $\frac{20^\circ}{20^\circ}$ C.	Sp. gr. $\frac{25^\circ}{25^\circ}$ C.
0	1.00000	1.00000	1.00000	51	0.91635	0.91322	0.91026
1	0.99812	0.99813	0.99811	52	0.91412	0.91097	0.90799
2	0.99629	0.99629	0.99627	53	0.91189	0.90872	0.90571
3	0.99451	0.99451	0.99447	54	0.90964	0.90645	0.90343
4	0.99281	0.99279	0.99274	55	0.90738	0.90418	0.90113
5	0.99118	0.99113	0.99106	56	0.90512	0.90191	0.89883
6	0.98963	0.98955	0.98945	57	0.90285	0.89962	0.89654
7	0.98815	0.98802	0.98788	58	0.90058	0.89733	0.89423
8	0.98670	0.98653	0.98634	59	0.89830	0.89502	0.89191
9	0.98528	0.98505	0.98481	60	0.89601	0.89271	0.88959
10	0.98390	0.98361	0.98330	61	0.89371	0.89040	0.88725
11	0.98256	0.98221	0.98184	62	0.89139	0.88807	0.88491
12	0.98126	0.98084	0.98039	63	0.88907	0.88574	0.88256
13	0.97999	0.97948	0.97897	64	0.88674	0.88339	0.88020
14	0.97875	0.97816	0.97757	65	0.88441	0.88104	0.87783
15	0.97754	0.97687	0.97619	66	0.88207	0.87869	0.87547
16	0.97637	0.97560	0.97484	67	0.87971	0.87632	0.87309
17	0.97518	0.97431	0.97346	68	0.87736	0.87396	0.87071
18	0.97398	0.97301	0.97207	69	0.87500	0.87158	0.86833
19	0.97276	0.97169	0.97065	70	0.87263	0.86920	0.86593
20	0.97152	0.97036	0.96922	71	0.87025	0.86680	0.86352
21	0.97028	0.96901	0.96778	72	0.86785	0.86440	0.86110
22	0.96902	0.96763	0.96630	73	0.86545	0.86200	0.85869
23	0.96773	0.96624	0.96481	74	0.86304	0.85958	0.85626
24	0.96642	0.96483	0.96329	75	0.86063	0.85716	0.85383
25	0.96508	0.96339	0.96176	76	0.85822	0.85473	0.85140
26	0.96371	0.96190	0.96018	77	0.85579	0.85230	0.84895
27	0.96228	0.96037	0.95856	78	0.85336	0.84985	0.84650
28	0.96080	0.95880	0.95689	79	0.85092	0.84740	0.84404
29	0.95927	0.95717	0.95520	80	0.84846	0.84494	0.84157
30	0.95769	0.95551	0.95345	81	0.84599	0.84245	0.83909
31	0.95607	0.95381	0.95168	82	0.84350	0.83997	0.83659
32	0.95440	0.95207	0.94986	83	0.84101	0.83747	0.83408
33	0.95269	0.95028	0.94802	84	0.83850	0.83496	0.83156
34	0.95094	0.94847	0.94613	85	0.83598	0.83242	0.82902
35	0.94915	0.94662	0.94422	86	0.83343	0.82987	0.82646
36	0.94732	0.94473	0.94227	87	0.83086	0.82729	0.82389
37	0.94546	0.94281	0.94031	88	0.82826	0.82469	0.82128
38	0.94355	0.94086	0.93830	89	0.82564	0.82207	0.81865
39	0.94161	0.93886	0.93626	90	0.82299	0.81942	0.81600
40	0.93964	0.93684	0.93421	91	0.82030	0.81674	0.81331
41	0.93764	0.93479	0.93212	92	0.81759	0.81401	0.81060
42	0.93559	0.93272	0.93001	93	0.81484	0.81127	0.80785
43	0.93352	0.93062	0.92787	94	0.81205	0.80848	0.80507
44	0.93143	0.92849	0.92571	95	0.80922	0.80567	0.80225
45	0.92933	0.92636	0.92355	96	0.80636	0.80280	0.79939
46	0.92721	0.92421	0.92137	97	0.80344	0.79988	0.79648
47	0.92506	0.92204	0.91917	98	0.80045	0.79688	0.79349
48	0.92291	0.91986	0.91697	99	0.79739	0.79383	0.79045
49	0.92075	0.91766	0.91475	100	0.79429	0.79074	0.78736
50	0.91856	0.91546	0.91251	...	......	......	......

From Hodgman and Lange, Handbook of Chemistry and Physics, 13th Edition, courtesy Chemical Rubber Publishing Co.

Indicated Volume of Completely Denatured Alcohol Formula No. 5 at Various Temperatures in Standard 55 Gallon Drums Filled to Exactly *53.00 Gallons at 60° Fahrenheit

Temperature Fahrenheit	Gallons	Temperature Fahrenheit	Gallons
90	53.95	40	52.36
80	53.64	30	52.05
70	53.32	20	51.73
60	53.00	10	51.41
50	52.68	0	51.09

* Two gallons outage provide for expansion of alcohol, without excessive internal pressure.

When filled to exactly 53 gallons at 60° Fahrenheit, the indicated volume will be two gallons over the above-mentioned figures.

Courtesy the U. S. Industrial Alcohol Co.

Apparent Proof of Finished Formulas of Completely and Specially Denatured Alcohol at 60° F/60° F.

Formula	Apparent Proof of Finished Formula	Formula	Apparent Proof of Finished Formula	Formula	Apparent Proof of Finished Formula	Formula	Apparent Proof of Finished Formula
C.D.1	188	20	171	S.D. 28A	200	38C	186
5	188	22	170	29	189	38D	185
S.D. 1	191	23	190	30	191	39	187
2A	189	23A	190	31A	146	39A	189
2B	190	23B	188	31B	181	39B	186
3A	191	23C	185	31C	179	39C	188
3B	189	23D	180	32	192	39D	189
4	189	23E	187	33	175	40	190
5	192	23F	188	33A	183	41	189
6B	190	25	168	35	179	42	190
11	193	26	185	35A	188	43	184
12A	189	27	187	36	188	44	190
13A	193	27A	186	37	190	44A	191
17	190	27B	134	37A	188	46	190
18	97	28	187	38	178	47	182
19	200			38A	186		

Courtesy the U. S. Industrial Alcohol Co.

Specific Gravity and Weight of One Gallon of Denatured Alcohol

[Weight of 1 gallon water at 15.6° C., 8.328 pounds]

COMPLETELY DENATURED

Specific Formula	Weight of 1 gallon at 15.6° C. *Pounds*	Specific gravity at $\frac{15.6^\circ \text{ C.}}{15.6^\circ \text{ C.}}$	Specific Formula	Weight of 1 gallon at 15.6° C. *Pounds*	Specific gravity at $\frac{15.6^\circ \text{ C.}}{15.6^\circ \text{ C.}}$
1	6.8278	0.81984	5	6.8278	0.81984

SPECIALLY DENATURED

Specific Formula	Weight of 1 gallon at 15.6° C. *Pounds*	Specific gravity at $\frac{15.6^\circ \text{ C.}}{15.6^\circ \text{ C.}}$	Specific Formula	Weight of 1 gallon at 15.6° C. *Pounds*	Specific gravity at $\frac{15.6^\circ \text{ C.}}{15.6^\circ \text{ C.}}$
1	6.785	0.8149	30	6.785	0.8149
2-B	6.795	.8161	31-A	7.167	.8608
3-A	6.781	.8144	32	6.769	.8130
4	6.797	.8164	35	6.956	.8355
6-B	6.801	.8169	35-A	6.821	.8193
12-A	6.820	.8192	36	6.837	.8211
13-A	6.740	.8095	37	6.794	.8160
17	6.795	.8161	38	6.970	.8371
18	7.802	.9369	38-B	6.804	.8172
19	6.468	.7769	38-C	6.832	.8206
23-A	6.788	.8153	39	6.863	.8242
23-C	6.898	.8285	39-A	6.806	.8174
23-E	6.840	.8215	39-B	6.856	.8234
23-F	6.808	.8177	39-C	6.824	.8196
25	7.040	.8455	39-D	6.819	.8190
25 Alt	7.066	.8486	40	6.792	.8158
27	6.846	.8222	42	6.797	.8164
27-A	6.867	.8247	44	6.790	.8155
27-B	7.027	.8439	44-A	6.783	.8147
29	6.822	.8194	45	7.545	.9061
			47	6.882	.8265

Specific gravity and weight of 1 gallon of liquid denaturants

Name	Weight of 1 gallon at 15.6° C. *Pounds*	Specific gravity at $\frac{15.6^\circ \text{ C.}}{15.6^\circ \text{ C.}}$	Name	Weight of 1 gallon at 15.6° C. *Pounds*	Specific gravity at $\frac{15.6^\circ \text{ C.}}{15.6^\circ \text{ C.}}$
Kerosene	6.723	0.8077	Methyl alcohol	6.622	0.7952
Acetone	6.632	.7964	Wood alcohol[1]	6.720	.8069
Benzol[1]	7.294	.8758	Ether[1]	6.009	.7215

[1] Denaturing grade

Courtesy of United States Bureau of Standards.

Corrections in Volume of Alcohol in 8,000 Gallon Tank Cars Due to Changes in Temperature from 60° Fahrenheit

When temperature of alcohol reads above or below 60° Fahrenheit, add to or subtract from the tank car gage the number of gallons shown opposite the corresponding temperature in the following table:

Temperature	Subtract	Temperature	Add	Temperature	Add
60° F.	0.0	60° F.	0.0	29° F.	138.3
61	4.8	59	4.8	28	143.0
62	9.6	58	9.6	27	147.6
63	14.5	57	14.3	26	152.3
64	19.3	56	19.1	25	156.9
65	24.1	55	23.9	24	161.5
66	28.9	54	28.7	23	166.1
67	33.8	53	33.4	22	170.7
68	38.6	52	38.2	21	175.3
69	43.5	51	42.9	20	179.9
70	48.3	50	47.7	19	184.5
71	53.2	49	52.4	18	189.0
72	58.1	48	57.2	17	193.6
73	62.9	47	61.9	16	198.1
74	67.8	46	66.7	15	202.7
75	72.7	45	71.4	14	205.7
76	77.6	44	76.1	13	208.8
77	82.5	43	80.8	12	211.8
78	87.4	42	85.5	11	214.9
79	92.3	41	90.2	10	217.9
80	97.2	40	94.9	9	222.4
81	102.1	39	98.0	8	226.9
82	107.0	38	101.1	7	231.5
83	112.0	37	104.3	6	236.0
84	116.9	36	107.4	5	240.5
85	121.8	35	110.5	4	245.0
86	126.8	34	115.1	3	249.5
87	131.7	33	119.8	2	254.1
88	136.7	32	124.4	1	258.6
89	141.6	31	129.1	0	263.1
90	146.6	30	133.7		
91	151.6				
92	156.6				
93	161.6				
94	166.6				
95	171.6				
96	176.6				
97	181.6				
98	186.7				
99	191.7				
100	196.7				

Courtesy the U. S. Industrial Alcohol Co.

Decimal Equivalents in Both Wine and Proof Gallons
Alcohol — 190 Proof

Ounces	Gallons (Wine)	Gallons (Proof)	Ounces	Gallons (Wine)	Gallons (Proof)	Ounces	Gallons (Wine)	Gallons (Proof)
1	.008	.015	44	.344	.653	87	.680	1.291
2	.016	.030	45	.352	.668	88	.688	1.306
3	.023	.045	46	.359	.683	89	.695	1.321
4	.031	.059	47	.367	.698	90	.703	1.336
5	.039	.074	48	.375	.713	91	.711	1.351
6	.047	.089	49	.383	.727	92	.719	1.366
7	.055	.104	50	.391	.742	93	.727	1.380
8	.063	.119	51	.398	.757	94	.734	1.395
9	.070	.134	52	.406	.772	95	.742	1.410
10	.078	.148	53	.414	.787	96	.750	1.425
11	.086	.163	54	.422	.802	97	.758	1.440
12	.094	.178	55	.430	.816	98	.766	1.455
13	.102	.193	56	.438	.831	99	.773	1.470
14	.109	.208	57	.445	.846	100	.781	1.484
15	.117	.223	58	.453	.861	101	.789	1.499
16	.125	.238	59	.461	.876	102	.797	1.514
17	.133	.252	60	.469	.891	103	.805	1.529
18	.141	.267	61	.477	.905	104	.813	1.544
19	.148	.282	62	.484	.920	105	.820	1.559
20	.156	.297	63	.492	.935	106	.828	1.573
21	.164	.312	64	.500	.950	107	.836	1.588
22	.172	.327	65	.508	.965	108	.844	1.603
23	.180	.341	66	.516	.980	109	.852	1.618
24	.188	.356	67	.523	.995	110	.859	1.633
25	.195	.371	68	.531	1.009	111	.867	1.648
26	.203	.386	69	.539	1.024	112	.875	1.663
27	.211	.401	70	.547	1.039	113	.883	1.677
28	.219	.416	71	.555	1.054	114	.891	1.692
29	.227	.430	72	.563	1.069	115	.898	1.707
30	.234	.445	73	.570	1.084	116	.906	1.722
31	.242	.460	74	.578	1.098	117	.914	1.737
32	.250	.475	75	.586	1.113	118	.922	1.752
33	.258	.490	76	.594	1.128	119	.930	1.766
34	.266	.505	77	.602	1.143	120	.938	1.781
35	.273	.520	78	.609	1.158	121	.945	1.796
36	.281	.534	79	.617	1.173	122	.953	1.811
37	.289	.549	80	.625	1.188	123	.961	1.826
38	.297	.564	81	.633	1.202	124	.969	1.841
39	.305	.579	82	.641	1.217	125	.977	1.856
40	.313	.594	83	.648	1.232	126	.984	1.870
41	.320	.609	84	.656	1.247	127	.992	1.885
42	.328	.623	85	.664	1.262	128	1.000	1.900
43	.336	.638	86	.672	1.277			

Courtesy the U. S. Industrial Alcohol Co.

Freezing Points of Antifreeze Solutions

Denatured Alcohol

% by Vol.	° F.	° C.	% by Vol.	° F.	° C.
5	+ 27.0	− 2.8	30	+ 5.4	− 14.8
10	+ 24.8	− 4.0	35	− 0.9	− 18.3
15	+ 21.2	− 6.0	40	− 7.8	− 22.1
20	+ 16.7	− 8.5	45	− 16.4	− 26.9
25	+ 11.3	− 11.5	50	− 24.0	− 31.1

Courtesy the U. S. Industrial Alcohol Co.

Freezing Points of Calcium Chloride Brine

The following table gives the strength and freezing points of solutions of $CaCl_2.2H_2O$ (75% $CaCl_2$).

SOLVAY PROCESS CO.

Specific Gravity at 20° C.	Lbs. $CaCl_2.2H_2O$ (75% $CaCl_2$) Per Gallon.	Lbs. $CaCl_2.2H_2O$ (75% $CaCl_2$) Per Cu. Ft.	Freezing Point, ° F.	Freezing Point, ° C.
1.100	1.46	10.9	+ 18.0	− 7.8
1.125	1.83	13.7	+ 12.5	− 10.8
1.150	2.20	16.5	+ 6.5	− 14.2
1.175	2.59	19.4	− 2.0	− 18.9
1.200	2.99	22.4	− 12.5	− 24.7
1.225	3.38	25.3	− 23.5	− 30.8
1.250	3.75	28.3	− 36.5	− 38.0

From Van Nostrand's Chemical Annual, courtesy D. Van Nostrand Co., Inc.

Freezing Points of Common Salt Brine

Solvay Process Co.

Degrees Baumé at 15° C.	Degrees Saltmeter	Specific Gravity at 15° C.	Per Cent Salt	Weight of One Gallon	Weight of One Cubic Foot	Freezing Point, ° F.	Freezing Point, ° C.
5.2	20	1.037	5	8.7	64.7	25.4	− 3.7
9.9	40	1.073	10	9.0	67.0	18.6	− 7.4
14.5	60	1.1115	15	9.3	69.6	12.2	− 11.0
19.0	80	1.150	20	9.6	71.8	6.9	− 13.9
23.3	100	1.191	25	9.9	74.3	1.0	− 17.2

From Van Nostrand's Chemical Annual, courtesy D. Van Nostrand Co., Inc.

Low Boiling Point Liquids

	B.P. ° C.	M.P. ° C.
Ammonia	− 33.35	− 77.34
Carbon dioxide	− 78.5	− 56.7
Ethyl chloride	12.5°	− 140.85
Liquid air	− 190	......
Nitrogen	− 195.8	− 210
Oxygen	− 183°	− 218.4
Sulphur dioxide	− 10	− 72.7

From Van Nostrand's Chemical Annual, courtesy D. Van Nostrand Co., Inc.

Freezing Mixtures

A is the proportion of the substance named to be added to the proportion of the substance given in column *B* to produce the reduction of temperature given in the last two columns.

Substance	A	B	Initial Temp. ° C.	Temp. Attained by Mixture ° C.
Alcohol	77	Snow 73°	0°	− 30.0°
		CO_2 solid		− 72.0
Ammonium carbonate	30	Water 100	15.3	3.2
Ammonium chloride	30	Water 100	13.3	− 5.1
	25	Snow 100	− 1	− 15.4
Ammonium nitrate	100	Water 94	20	− 4
	100	“ 120	10	− 14
	100	“ 131	10	− 17.5
	100	Snow 94	0	− 4.0
	100	“ 120	0	− 14.0
	100	“ 131	0	− 17.5
Ammonium sulphate	75	Water 100	13.2	6.8
Ammonium thiocyanate	133	“ 100	13.2	− 18.0
Calcium chloride cryst	100	“ 40	10.8	− 12.4
Cryst. $CaCl_2.2H_2O$	100	Snow 70	− 1	− 50
Cryst. $CaCl_26H_2O$	100	“ 49	0	− 19.7
	100	“ 61	0	− 39.0
	100	“ 70	0	− 54.9
	100	“ 81	0	− 40.3
	100	“ 123	0	− 21.5
	100	“ 246	0	− 9.0
	100	“ 492	0	− 4.0
Chloroform	...	CO_2 solid	......	− 77
Ether	...	CO_2 solid	− 1	− 100
Potassium chloride	30	Water 100	13.2	0.6
“ iodide	140	“ 100	10.8	− 11.7
“ nitrate	16	“ 100	13.2	3.0
	13	Snow 100	− 1	− 2.85
“ thiocyanate	150	Water 100	10.8	− 23.7
Sodium acetate cryst	85	“ 100	10.7	− 4.7
“ carbonate cryst	40	“ 100	10.7	1.6
“ chloride	36	“ 100	12.6	10.1
	33	Snow 100	− 1.0	− 21.3
“ nitrate	75	Water 100	13.2	− 5.3
	50	Snow 100	− 1.0	− 17.75
“ sulphate cryst	20	Water 100	12.5	5.7
“ thiosulphate cryst	110	Water 100	10.7	− 8.0
Sulphur dioxide liquid	...	CO_2 solid	......	− 82
Sulphuric acid $H_2SO_4 + H_2O$	100	Snow 109.7	− 1	− 37.0
(66.1% H_2SO_4)	100	“ 252	− 1	− 30.0
	100	“ 432	− 1	− 25.0
	100	“ 792	− 1	− 20.0
	100	“ 1308	− 1	− 16.0

From Van Nostrand's Chemical Annual, courtesy D. Van Nostrand Co. ,Inc.

Boiling Temperatures of Some Solutions at Atmospheric Pressure[a]

Substance	Per Cent. Anhydrous Solid								
	10%	20%	30%	40%	50%	60%	70%	80%	100%
Ammonium chloride (NH_4Cl)	215.1°	219.3°	225.7°	232.7°	46.9% 239.0°	....	....	....	....
Ammonium nitrate (NH_4NO_3)	214.0°	216.5°	219.5°	223.5°	228.9°	243.4°	256.0°	100% 464.0°	....
Ammonium sulphate ($(NH_4)_2SO_4$)	213.3°	214.9°	217.3°	220.4°	224.8°	53.6% 226.8°	....	....	....
Barium chloride ($BaCl_2$)	213.6°	215.5°	218.1°	35.5% 220.1°	....	....	....	....	....
Calcium chloride ($CaCl_2$)	215.4°	221.0°	230.5°	246.7°	266.0°	290.8°	324.5°	75.8% 356.0°	....
Calcium nitrate ($Ca(NO_3)_2$)	214.0°	216.5°	219.7°	224.1°	230.5°	242.6°	264.7°	297.5°	82.0% 306.0°
Citric acid ($C_6H_8O_7$)	212.7°	213.6°	215.0°	216.9°	219.5°	223.5°	230.9°	244.0°	....
Copper sulphate ($CuSO_4$)	212.2°	212.9°	214.3°	217.1°	45.0% 219.6°	....	....	....	....
Lead acetate ($Pb(C_2H_3O_2)_2$)	212.3°	212.6°	213.0°	213.5°	214.3°	215.2°	216.8°	219.6°	271.0°
Lithium chloride ($LiCl$)	218.0°	229.1°	252.0°	277.0°	306.0°	334.0°	....	....	....
Magnesium chloride ($MgCl_2$)	216.4°	224.2°	239.9°	38.5% 266.0°	....	....	....	....	....
Magnesium sulphate ($MgSO_4$)	213.1°	214.9°	218.1°	224.2°	42.7% 226.4°	....	....	....	....
Oxalic acid ($(COOH)_2$)	213.5°	215.6°	218.1°	221.9°	....	....	....	....	....
Potassium acetate ($KC_2H_3O_2$)	215.3°	219.3°	224.2°	230.5°	240.5°	252.0°	271.0°	298.0°	86.3% 322.0°
Potassium carbonate (K_2CO_3)	213.6°	216.0°	219.7°	226.6°	237.7°	263.0°	67.0% 272.0°	....	....
Potassium chlorate ($KClO_3$)	213.5°	215.3°	217.3°	219.6°	41.3% 219.9°	....	....	....	....
Potassium chloride (KCl)	214.2°	217.8°	223.0°	36.4% 227.3°	....	....	....	....	....
Potassium hydrate (KOH)	216.3°	223.8°	236.3°	257.5°	292.0°	352.0°	441.0°	554.0°	....
Potassium iodide (KI)	213.3°	214.9°	217.1°	220.1°	224.6°	231.8°	68.7% 244.3°	....	....
Potassium nitrate (KNO_3)	213.3°	214.9°	216.9°	219.4°	222.7°	227.1°	232.7°	79.5% 239.0°	....
Potassium sodium tartrate ($KNaC_4H_4O_6$)	213.2°	214.7°	216.5°	219.1°	222.6°	227.8°	235.2°	248.5°	329.0°
Potassium sulphate (K_2SO_4)	213.4°	215.0°	23.1% 215.6°	....	....	....	....	....	....
Potassium tartrate ($K_2C_4H_4O_6$)	213.2°	214.7°	216.5°	219.1°	222.8°	228.5°	237.7°	....	....
Sodium acetate ($NaC_2H_3O_2$)	214.3°	217.8°	222.8°	230.4°	239.0°	249.0°	67.5% 257.0°	....	....
Sodium borate ($Na_2B_4O_7$)	213.2°	214.5°	216.1°	217.8°	47.6% 219.2°	....	....	....	....
Sodium carbonate (Na_2CO_3)	213.9°	216.3°	219.5°	....	....	....	....	....	....
Sodium chloride ($NaCl$)	215.3°	220.8°	29.0% 227.8°	33.9% 221.0°	....	....	....	....	....
Sodium hydrate ($NaOH$)	217.1°	226.4°	241.7°	263.0°	288.0°	319.0°	358.0°	405.0°	597.0°
Sodium hydrogen phosphate (Na_2HPO_4)	213.1°	214.6°	216.5°	219.0°	222.6°	52.5% 223.7°	....	....	....
Sodium nitrate ($NaNO_3$)	214.2°	216.7°	220.1°	224.4°	230.0°	239.0°	69.0% 248.0°	....	....
Sodium sulphate (Na_2SO_4)	213.0°	214.6°	217.1°	31.7% 217.8°	....	....	....	....	....
Sodium tartrate ($Na_2C_4H_4O_6$)	213.1°	214.6°	216.4°	219.0°	222.5°	59.3% 227.1°	....	....	....
Sodium thiosulphate ($Na_2S_2O_3$)	213.4°	215.3°	217.9°	222.8°	229.4°	238.0°	250.0°	75.0% 257.0°	....
Strontium chloride ($SrCl_2$)	213.8°	216.5°	220.8°	228.7°	239.0°	....	....	....	....
Strontium nitrate ($Sr(NO_3)_2$)	212.8°	213.9°	215.4°	217.7°	221.4°	53.7% 223.3°	....	....	....
Sucrose ($C_{12}H_{22}O_{11}$)	212.2°	212.5°	213.1°	214.0°	215.4°	217.6°	221.6°	230.5°	....
Tartaric acid ($H_2C_4H_4O_6$)	213.2°	214.6°	216.5°	218.9°	222.4°	227.3°	237.0°	250.0°	338.0°
Zinc sulphate ($ZnSO_4$)	212.7°	213.8°	215.3°	218.1°	46.1% 221.0°	....	....	....	....

[a] Determinations by C. S. Robinson.

From Webre and Robinson, Evaporation, The Chemical Catalog Co., Inc.

Flash Points of Oils and Volatile Liquids

Liquid	Flash Point	
	C.°	F.°
Acetic acid, glacial	44	111.2
Acetic anhydride	43.5	110
Acetone	1.8	35
Alcohol, allyl	21.5	70
amyl (primary)	46	114.8
amyl (tertiary)	19.5	67
butyl (primary)	35	95
butyl (tertiary)	11.5	52
denatured	4.5 to 15.5	40 to 60
ethyl, 100%	12	53.6
" , 80%	19	66.2
" , 60%	22.75	72.9
" , 40%	26.25	80
" , 20%	36.75	98
" , 10%	49.0	120.2
isoamyl (primary)	42	107.6
isobutyl	27.5	81.5
methyl, 100%	9.5	49.1
" , 80%	16.75	62.1
" , 60%	22.75	72.9
" , 40%	30	86.0
" , 20%	44.25	111.6
" , 10%	58.75	137.7
propyl (primary)	23	73.4
propyl (secondary)	11.75	53.1
Amyl acetate	24.5	77.1
Anilin	26	78.8
Benzol, 90%	15	59.0
" , 50%	5	41
Benzine	− 15	5
" , 60° Bé	− 7 to 0	19.4 to 32
" , 55° Bé	− 3.5 to − 1.8	27.5 to 31.8
" , 48° Bé	29.5 to 40.5	85.1 to 105
Carbon disulphide	− 20	4
Cumene, commercial	39	102.2

Liquid	Flash Point	
	C.°	F.°
Dead oil, light dist	10 to 24	50 to 75
heavy dist	48.8 to 82.4	120 to 180
Dimethyl aniline	76	168.8
Ether	− 20	4
acetic	0 to 5	32 to 41
petroleum (0.7 sp. gr.)	− 20	4
Ethyl acetate	4.8	40.6
Ethyl chloride	− 18	0
Fusel oil	43.5 to 54.5	110 to 130
Gasoline 87° Bé	− 18	0
" 62° Bé	− 18 to − 15	0 to 5
Kerosene	27 to 33	80.6 to 91.4
Methyl acetate	4.6	40
Monochlorbenzol	27.5	81
Naphtha, heavy	32.5 to 42.5	60.5 to 108.5
solvent	4.5 to 18.8	40 to 66
Nitrobenzene	90	194
Oil, camphor	55	131
cotton seed	170	338
engine spindle	135 to 190	275 to 375
lard	240	464
light motor	200	392
linseed	316 to 350	600–660
lubricating	260–320	500–600
Oil, olive	215 to 216	420
paraffin	107	224.6
petroleum	21 to 23	69.8 to 73.4
poppy	255	491
rape	210 to 305	410 to 581
rosin	130	266
sesame	255	491
Pentane	− 18	0
Rosin spirit, coml	30.5 to 43.5	87 to 110.3
refined	32.4 to 40.6	90 to 105
Toluene	7	44.6
Toluidine	85	185
Turpentine	35	95
sap.	32.5 to 40.8	90.5 to 105
wood distn	31.1 to 44.2	90 to 111.5
Xylene	30	86
Xylidine	97	206.6

From Van Nostrand's Chemical Annual, courtesy D. Van Nostrand Co., Inc.

Viscosities in Centipoises of Sugar Solutions

Temp. °C.	Grams	Sucrose in 100 Grams Solution		
	0	20	40	80
0°	1.7920	3.804	14.77	238.0
10°	1.3077	2.652	9.7494	109.8
20°	1.0050	1.960	6.200	56.5
30°	.8007	1.504	4.382	33.78
40°	.6560	1.193	3.249	21.28
50°	.5490	.970	2.497	14.01
60°	.4690	.808	1.982	9.83
70°	.4060	....	....	....
80°	.3560	....	....	....
90°	.3160	....	....	....
100°	.2840	....	....	....

From Webre and Robinson, Evaporation, The Chemical Catalog Co., Inc.

Solubility of Air in Water[a]

EXPRESSED AS CUBIC FEET OF DRY AIR AT STANDARD CONDITIONS IN ONE CUBIC FOOT OF WATER

(32° F. and 29.92″)

° C.	° F.	Solubility	Total Pressure in Atmospheres Air + Water Vapor	Calculated Solubility Where Total Pressure Is One Atmosphere, Assuming Henry's Law
0	32.0	0.02881	1.005	0.02865
1	33.8	2808	6	2790
2	35.6	2738	7	2715
3	37.4	2670	7	2650
4	39.2	2606	8	2585
5	41.0	2543	9	2520
6	42.8	2482	10	2460
7	44.6	2424	10	2400
8	46.4	2369	11	2345
9	48.2	2316	11	2290
10	50.0	2264	12	2240
11	51.8	2217	13	2190
12	53.6	2171	14	2140
13	55.4	2127	15	2095
14	57.2	2085	16	2055
15	59.0	2045	17	2010
16	60.8	2005	18	1970
17	62.6	1970	19	1935
18	64.4	1935	20	1895
19	66.2	1901	21	1860
20	68.0	1869	23	1825
21	69.8	1838	24	1795
22	71.6	1808	26	1760
23	73.4	1779	27	1735
24	75.2	1751	29	1700
25	77.0	1724	31	1675
26	78.8	1698	33	1640
27	80.6	1674	35	1618
28	82.4	1650	37	1590
29	84.2	1627	39	1565
30	86.0	1606	41	1545
35	95.0	1503	55	1425
40	104.0	1418	72	1325
45	113.0	1351	94	1235
50	122.0	1297	121	1155
60	140.0	1216	196	1015
70	158.0	1156	307	883
80	176.0	1126	465	768
90	194.0	1113	691	658
100	212.0	1105	2.000	553

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[a] Winkler, Landolt-Bornstein-Roth Tabellen.

From Webre and Robinson, Evaporation, The Chemical Catalog Co., Inc.

Universal Dilution Table

If 100 volumes of solution of the percentage strength by volume shown in the first column are diluted until the total volume has one of the values given in the body of the table the strength of the diluted solution is that given at the head of the column above the volume of the diluted solution. For example, suppose that it is required to dilute a solution whose strength is 75% by volume to a strength of 20% by volume. From the table it will be seen that each 100 cc. of the original solution must be diluted until the total volume of the solution is 375.00 cc. If it is desired to make 1000 cc. of the 20% solution from the 75% solution then $100 \text{ x } \frac{1000}{375}$ *i.e.*, 266.67 cc. of the latter must be diluted to 1000 cc. The initial and final temperatures must be the same.

PERCENTAGE BY VOLUME AFTER DILUTION

Original Percentage by Volume.	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5
100	105.26	111.11	117.65	125.00	133.33	142.86	153.85	166.67	181.82	200.00	222.22	250.00	285.71	333.33	400.00	500.00	666.67	1000.00	2000.00
95	....	105.56	111.76	118.75	126.67	135.71	146.15	158.33	172.73	190.00	211.11	237.50	271.43	316.67	380.00	475.00	633.33	950.00	1900.00
90	....	....	105.88	112.50	120.00	128.57	138.46	150.00	163.64	180.00	200.00	225.00	257.14	300.00	360.00	450.00	600.00	900.00	1800.00
85	....	....	....	106.25	113.33	121.43	130.77	141.67	154.54	170.00	188.89	212.50	242.86	283.33	340.00	425.00	566.67	850.00	1700.00
80	....	....	....	....	106.67	114.29	123.08	133.33	145.45	160.00	177.78	200.00	228.57	266.67	320.00	400.00	533.33	800.00	1600.00
75	....	....	....	....	....	107.14	115.38	125.00	136.36	150.00	166.67	187.50	221.43	250.00	300.00	375.00	500.00	750.00	1500.00
70	....	....	....	....	....	....	107.69	116.67	127.27	140.00	155.56	175.00	200.00	233.33	280.00	350.00	466.67	700.00	1400.00
65	....	....	....	....	....	....	....	108.33	118.18	130.00	144.44	162.50	185.71	216.67	260.00	325.00	433.33	650.00	1300.00
60	....	....	....	....	....	....	....	....	109.09	120.00	133.33	150.00	171.43	200.00	240.00	300.00	400.00	600.00	1200.00
55	....	....	....	....	....	....	....	....	....	110.00	122.22	137.50	157.14	183.33	220.00	275.00	366.67	550.00	1100.00
50	....	....	....	....	....	....	....	....	....	....	111.11	125.00	142.86	166.67	200.00	250.00	333.33	500.00	1000.00
45	....	....	....	....	....	....	....	....	....	....	....	112.50	128.57	150.00	180.00	225.00	300.00	450.00	900.00
40	....	....	....	....	....	....	....	....	....	....	....	....	114.29	133.33	160.00	200.00	266.67	400.00	800.00
35	....	....	....	....	....	....	....	....	....	....	....	....	....	116.67	140.00	175.00	233.33	350.00	700.00
30	....	....	....	....	....	....	....	....	....	....	....	....	....	....	120.00	150.00	200.00	300.00	600.00
25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	125.00	166.67	250.00	500.00
20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	133.33	200.00	400.00
15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	150.00	300.00
10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	200.00

From Atack, The Chemists' Year Book, 1929, The Chemical Catalog Co., Inc.

Capacities of Rectangular Tanks in U. S. Gallons, for Each Foot in Depth

1 cubic foot = 7.4805 U. S. gallons.

Width of Tank	Length of Tank.										
	ft. 2	ft. in. 2 2	ft. 3	ft. in. 3 6	ft. 4	ft. in. 4 6	ft. 5	ft. in. 5 6	ft. 6	ft. in. 6 6	ft. 7
ft. in.											
2	29.92	37.40	44.88	52.36	59.84	67.32	74.81	82.29	89.77	97.25	104.73
2 6	....	46.75	56.10	65.45	74.80	84.16	93.51	102.86	112.21	121.21	130.91
3	....	....	67.32	78.54	89.77	100.99	112.21	123.43	134.65	145.87	157.09
3 6	....	....	....	91.64	104.73	117.82	130.91	144.00	157.09	170.18	183.27
4	....	....	....	....	119.69	134.65	149.61	164.57	179.53	194.49	209.45
4 6	....	....	....	....	....	151.48	168.31	185.14	201.97	218.80	235.62
5	....	....	....	....	....	....	187.01	205.71	224.41	243.11	261.82
5 6	....	....	....	....	....	....	....	226.28	246.86	267.43	288.00
6	....	....	....	....	....	....	....	....	269.30	291.74	314.18
6 6	....	....	....	....	....	....	....	....	....	316.05	340.36
7	....	....	....	....	....	....	....	....	....	....	366.54

Width of Tank	Length of Tank									
	ft. in. 7 6	ft. 8	ft. in. 8 6	ft. 9	ft. in. 9 6	ft. 10	ft. in. 10 6	ft. 11	ft. in. 11 6	ft. 12
ft. in.										
2	112.21	119.68	127.17	134.65	142.13	149.61	157.09	164.57	172.05	179.53
2 6	140.26	149.61	158.96	168.31	177.66	187.01	196.36	205.71	215.06	224.41
3	168.31	179.53	190.75	202.97	213.19	224.41	235.63	246.86	258.07	269.30
3 6	196.36	209.45	222.54	235.63	248.26	261.82	274.90	288.00	301.09	314.18
4	224.41	239.37	254.34	269.30	284.26	299.22	314.18	329.14	344.10	359.06
4 6	252.47	269.30	286.13	302.96	319.79	336.62	353.45	370.28	387.11	403.94
5	280.52	299.22	317.92	336.62	355.32	374.03	392.72	411.43	430.13	448.83
6	336.62	359.06	381.50	403.94	426.39	448.83	471.27	493.71	516.15	538.59
6 6	364.67	388.98	413.30	437.60	461.92	486.23	510.54	534.85	559.16	583.47
7	392.72	418.91	445.09	471.27	497.45	523.64	549.81	565.99	602.18	628.36
7 6	420.78	448.83	476.88	504.93	532.98	561.04	589.08	617.14	645.19	673.24
8	....	478.75	508.67	538.59	568.51	598.44	625.36	658.28	688.20	718.21
8 6	....	....	540.46	572.25	604.05	635.84	667.63	699.42	731.21	763.00
9	....	....	....	605.92	639.58	673.25	706.90	740.56	774.23	807.89
9 6	....	....	....	....	675.11	710.65	746.17	781.71	817.24	852.77
10	....	....	....	....	....	748.05	785.45	822.86	860.26	897.66
10 6	....	....	....	....	....	....	824.73	864.00	903.26	942.56
11	....	....	....	....	....	....	....	905.14	946.27	987.43
11 6	....	....	....	....	....	....	....	....	989.29	1032.3
12	....	....	....	....	....	....	....	....	....	1077.2

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From Van Nostrand's Chemical Annual, courtesy D. Van Nostrand Co., Inc.

Cylindrical Vessels, Tanks, Cisterns, etc.

DIAMETER IN FEET AND INCHES, AREA IN SQUARE FEET AND U. S. GALLONS CAPACITY FOR ONE FOOT IN DEPTH

$$1 \text{ gallon} - 231 \text{ cubic inches} = \frac{1 \text{ cubic foot}}{7.4805} = 0.13368 \text{ cubic feet.}$$

Diam.		Area	Gals.	Diam.		Area	Gals.	Diam.		Area	Gals.
Ft.	In.	Sq. Ft.	1 Foot Depth	Ft.	In.	Sq. Ft.	1 Foot Depth	Ft.	In.	Sq. Ft.	1 Foot Depth
1		0.785	5.87	5	8	25.22	188.66	19		283.55	2120.9
1	1	0.922	6.89	5	9	25.97	194.25	19	3	291.04	2177.1
1	2	1.069	8.00	5	10	26.73	199.92	19	6	298.65	2234.0
1	3	1.227	9.18	5	11	27.49	205.67	19	9	306.35	2291.7
1	4	1.396	10.44	6		28.27	211.51	20		314.16	2350.1
1	5	1.576	11.79	6	3	30.68	229.50	20	3	322.06	2409.2
1	6	1.767	13.22	6	6	33.18	248.23	20	6	330.06	2469.1
1	7	1.969	14.73	6	9	35.78	267.69	20	9	338.16	2529.6
1	8	2.182	16.32	7		38.48	287.88	21		346.36	2591.0
1	9	2.405	17.99	7	3	41.28	308.81	21	3	354.66	2653.0
1	10	2.640	19.75	7	6	44.18	330.48	21	6	363.05	2715.8
1	11	2.885	21.58	7	9	47.17	352.88	21	9	371.54	2779.3
2		3.142	23.50	8		50.27	376.01	22		380.13	2843.6
2	1	3.409	25.50	8	3	53.46	399.88	22	3	297.61	2908.6
2	2	3.687	27.58	8	6	56.75	424.48	22	6	397.61	2974.3
2	3	3.976	29.74	8	9	60.13	449.82	22	9	406.49	3040.8
2	4	4.276	31.99	9		63.62	475.89	23		415.48	3108.0
2	5	4.587	34.31	9	3	67.20	502.70	23	3	424.56	3175.9
2	6	4.909	36.72	9	6	70.88	530.24	23	6	433.74	3244.6
2	7	5.241	39.21	9	9	74.66	558.51	23	9	443.01	3314.0
2	8	5.585	41.78	10		78.54	587.52	24		452.39	3384.1
2	9	5.940	44.43	10	3	82.52	617.26	24	3	461.86	3455.0
2	10	6.305	47.16	10	6	86.59	647.74	24	6	471.44	3526.6
2	11	6.681	49.98	10	9	90.76	678.95	24	9	481.11	3598.9
3		7.069	52.88	11		95.03	710.90	25		490.87	3672.0
3	1	7.467	55.86	11	3	99.40	743.58	25	3	500.74	3745.8
3	2	7.876	58.92	11	6	103.87	776.99	25	6	510.71	3820.3
3	3	8.296	62.06	11	9	108.43	811.14	25	9	520.77	3895.6
3	4	8.727	65.28	12		113.10	846.03	26		530.93	3971.6
3	5	9.168	68.58	12	3	117.86	881.65	26	3	541.19	4048.4
3	6	9.621	71.97	12	6	122.72	918.00	26	6	551.55	4125.9
3	7	10.085	75.44	12	9	127.68	955.09	26	9	562.00	4204.1
3	8	10.559	78.99	13		132.73	992.91	27		572.56	4283.0
3	9	11.045	82.62	13	3	137.89	1031.5	27	3	583.21	4362.7
3	10	11.541	86.33	13	6	143.14	1070.8	27	6	593.96	4443.1
3	11	12.048	90.13	13	9	148.49	1110.8	27	9	604.81	4524.3
4		12.566	94.00	14		153.94	1151.5	28		615.75	4606.2
4	1	13.095	97.96	14	3	159.48	1193.0	28	3	626.80	4688.8
4	2	13.635	102.00	14	6	165.13	1235.3	28	6	637.94	4772.1
4	3	14.186	106.12	14	9	170.87	1278.2	28	9	649.18	4856.2
4	4	14.748	110.32	15		176.71	1321.9	29		660.52	4941.0
4	5	15.321	114.61	15	3	182.65	1366.5	29	3	671.96	5026.6
4	6	15.90	118.97	15	6	188.69	1411.5	29	6	683.49	5112.9
4	7	16.50	123.42	15	9	194.83	1457.4	29	9	695.13	5199.9
4	8	17.10	127.95	16		201.06	1504.1	30		706.86	5287.7
4	9	17.72	132.56	16	3	207.39	1551.4	30	3	718.69	5376.2
4	10	18.35	137.25	16	6	213.82	1599.5	30	6	730.62	5465.7
4	11	18.99	142.02	16	9	220.35	1648.4	30	9	742.64	5555.4
5		19.63	146.88	17		226.98	1697.9	31		754.77	5646.1
5	1	20.29	151.82	17	3	233.71	1748.2	31	3	766.99	5737.5
5	2	20.97	156.83	17	6	240.55	1799.3	31	6	779.31	5829.7
5	3	21.65	161.93	17	9	247.45	1851.1	31	9	791.73	5922.6
5	4	22.34	167.12	18		254.47	1903.6	32		804.25	6016.2
5	5	23.04	172.38	18	3	261.59	1956.8	32	3	816.86	6110.6
5	6	23.76	177.72	18	6	268.80	2010.8	32	6	829.58	6205.7
5	7	24.48	183.15	18	9	276.12	2065.5	32	9	842.39	6301.5

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Ionization Constants of Acids and Bases

Acids	° C.	H+	K_a.
Acetic	0	....	1.75×10^{-5}
	10	....	1.83×10^{-5}
	18	....	1.82×10^{-5}
	25	....	1.86×10^{-5}
	100	....	1.11×10^{-5}
Aluminum Hydroxide	25	....	6.3×10^{-13}
Arsenic	25	1st	$5. \times 10^{-3}$
	25	2d	$4. \times 10^{-5}$
	25	3d	6.1×10^{-10}
Arsenious	25	....	$6. \times 10^{-10}$
Benzoic	....	....	$6. \times 10^{-5}$
Boric	25	....	6.5×10^{-10}
Butyric	25	....	1.5×10^{-5}
Carbonic	18	1st	$3. \times 10^{-7}$
	25	2d	$6. \times 10^{-11}$
Citric	....	1st	8.3×10^{-4}
	....	2d	4.1×10^{-5}
	....	3d	3.2×10^{-6}
Formic	....	....	2.1×10^{-4}
Hydrocyanic	18	....	1.3×10^{-9}
Hydrogen Peroxide	25	....	2.4×10^{-12}
Hydrogen Sulphide	18	1st	9.1×10^{-8}
Hypochlorous	25	....	6.7×10^{-10}
Iodic	25	....	1.9×10^{-1}
Lactic	25	....	1.4×10^{-4}
Malonic	25	....	1.58×10^{-3}
Methyl Orange	25	....	$4. \times 10^{-4}$
Methyl Red	25	....	$1. \times 10^{-5}$
Mucic	....	....	6.3×10^{-4}
Nitrous	18	....	$4. \times 10^{-4}$
Oxalic	25	1st	3.8×10^{-2}
	25	2d	$3. \times 10^{-5}$
Periodic	25	....	2.3×10^{-2}
Phenol	25	....	1.1×10^{-10}
Phenolphthalein	18	....	$2. \times 10^{-10}$
Phenolsulfonphthalein	18	....	$1. \times 10^{-8}$
Phosphoric	18	1st	1.1×10^{-2}
	18	2d	$2. \times 10^{-7}$
	18	3d	3.6×10^{-13}
Phosphorous	25	1st	$5. \times 10^{-2}$
	25	2d	$2. \times 10^{-5}$
Picric	25	....	1.6×10^{-1}
Propionic	25	....	1.4×10^{-5}
Salicylic	25	....	1.06×10^{-3}
Selenious	25	1st	$3. \times 10^{-3}$
	25	2d	5.1×10^{-8}
Succinic	25	1st	6.8×10^{-5}
	25	2d	2.7×10^{-6}
Sucrose	25	....	1.85×10^{-13}
Sulphanilic	25	....	6.2×10^{-4}
Sulphuric	25	1st	$4. \times 10^{-1}$(?)
	18	2d	1.9×10^{-2}
Sulphurous	25	1st	1.7×10^{-2}
	25	2d	$5. \times 10^{-6}$
Tartaric	25	1st	9.7×10^{-4}
	25	2d	4.5×10^{-5}
Telluric	25	1st	$6. \times 10^{-7}$
	25	2d	$4. \times 10^{-11}$
Tellurious	25	1st	$3. \times 10^{-3}$
	25	2d	$2. \times 10^{-8}$
Thiosulphuric	25	....	$1. \times 10^{-2}$

Bases	° C.	OH−	K_b.
Acetanilide	40	....	4.1×10^{-14}
Ammonia	0	....	1.4×10^{-5}
	10	....	1.63×10^{-5}
	18	....	1.75×10^{-5}
	25	....	1.80×10^{-5}
	40	....	1.98×10^{-5}
	100	....	1.35×10^{-5}
Aniline	25	....	4.6×10^{-10}
Arsenious Oxide	25	....	1.1×10^{-14}
Beryllium Hydroxide	25	2d	$5. \times 10^{-11}$
Caffeine	40	....	4.1×10^{-14}
Creatine	40	....	1.9×10^{-11}
Creatinine	40	....	3.7×10^{-11}
Guanine	40	....	8.4×10^{-12}
Hydrazine	25	....	$3. \times 10^{-6}$
Lead Hydroxide	25	2d	$3. \times 10^{-8}$
Methyl Amine	25	....	$5. \times 10^{-7}$
Pyridine	25	....	2.3×10^{-9}
Quinine	15	....	2.2×10^{-7}
Silver Hydroxide	25	....	1.1×10^{-4}
Urea	25	....	1.5×10^{-14}
Xanthine	40	....	4.8×10^{-14}
Zinc Hydroxide	25	2d	1.5×10^{-9}

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Dissociation Constants of Acids

Acid	Formula	Constant for the first hydrogen	Temp. ° C.	Constant for the second hydrogen	Temp. ° C.
Acetic	$C_2H_4O_2$	1.86×10^{-5}	25		
α-Alanine	$C_3H_7O_2N$	9×10^{-10}	25		
Arsenic	H_3AsO_4	5×10^{-3}	25	4×10^{-5}	25
				6×10^{-10}(3H)	25
Arsenious	H_3AsO_3	6×10^{-10}	25		
Barbituric	$C_4H_4O_3N$	1.05×10^{-4}	25		
Benzoic	$C_7H_6O_2$	6.6×10^{-5}	25		
Boric	H_3BO_3	6.4×10^{-10}	25		
Bromacetic	$C_2H_3O_2Br$	1.38×10^{-3}	25		
α-Brompropionic	$C_3H_5O_2Br$	1.08×10^{-3}	25		
β-Brompropionic	$C_3H_5O_2Br$	9.8×10^{-5}	25		
Butyric	$C_4H_8O_2$	1.48×10^{-5}	25		
Carbonic	H_2CO_3	3×10^{-7}	18	6×10^{-11}	25
Chloracetic	$C_2H_3O_2Cl$	1.55×10^{-3}	25		
α-Chlorpropionic	$C_3H_5O_2Cl$	1.47×10^{-3}	25		
β-Chlorpropionic	$C_3H_5O_2Cl$	8.59×10^{-5}	25		
Citric	$C_6H_8O_7$	8×10^{-4}	25		
Dichloracetic	$C_2H_2O_2Cl_2$	5×10^{-2}	25		
Formic	CH_2O_2	2.14×10^{-4}	25		
Fumaric	$C_4H_4O_4$	1×10^{-3}	25	3×10^{-5}	25
Hippuric	$C_9H_9O_3N$	2.3×10^{-4}	25		
Hydrocyanic	CHN	7.2×10^{-10}	25		
Hydroquinone	$C_6H_6O_2$	1.1×10^{-10}	18		
Hydrosulfuric	H_2S	9.1×10^{-8}	18	1.2×10^{-15}	
Hydrazoic	HN_3	1.9×10^{-5}	25		
Hypochlorous	$HOCl$	3.7×10^{-8}	17		
Iodic	HIO_3	1.9×10^{-1}	25		
Isobutyric	$C_4H_8O_2$	1.5×10^{-5}	25		
Isovaleric	$C_5H_{10}O_2$	1.7×10^{-5}	25		
Lactic	$C_3H_6O_3$	1.38×10^{-4}	25		
Maleic	$C_4H_4O_4$	1.5×10^{-2}	25	2.6×10^{-7}	25
Malic	$C_4H_6O_5$	4×10^{-4}	25	9×10^{-6}	25
Malonic	$C_3H_4O_4$	1.61×10^{-3}	25	2.1×10^{-6}	25
Mandelic	$C_8H_8O_3$	4.29×10^{-4}	25		
α-Naphthoic	$C_{11}H_8O_2$	2×10^{-4}	25		
β-Naphthoic	$C_{11}H_8O_2$	6.8×10^{-5}	25		
Nicotinic	$C_6H_5O_2N$	1.4×10^{-5}	25		
Nitrous	HNO_2	4×10^{-4}	18		
Oxalic	$C_2H_4O_4$	3.8×10^{-2}	25	4.9×10^{-5}	25
Periodic	HIO_4	2.3×10^{-2}	25		
Phenol	C_6H_6O	1.3×10^{-10}	25		
Phosphoric	H_3PO_4	1.1×10^{-2}	18	2×10^{-7}	18
				3.6×10^{-13}(3H)	18
Phosphorous	H_3PO_3	5×10^{-2}	25	2×10^{-5}	25
Phthalic	$C_8H_6O_4$	1.26×10^{-3}	25	3.1×10^{-6}	25
Picolinic	$C_6H_5O_2N$	3×10^{-5}	25		

Dissociation Constants of Acids (*Continued*)

Acid	Formula	Constant for the first hydrogen	Temp. ° C.	Constant for the second hydrogen	Temp. ° C.
Picric	$C_6H_3O_7N_3$	1.6×10^{-1}	18		
Propionic	$C_3H_6O_2$	1.4×10^{-5}	25		
Pyromucic	$C_5H_4O_3$	7.1×10^{-4}	25		
Pyrophosphoric	$H_4P_2O_7$	1.4×10^{-1}	18	1.1×10^{-2}	18
				2.9×10^{-7}(3H)	18
				3.6×10^{-9}(4H)	18
Pyrotartaric	$C_5H_8O_4$	8.7×10^{-5}	25		
Salicylic	$C_7H_6O_3$	1.06×10^{-3}	25	1×10^{-13}	20
Selenious	H_2SeO_3	3×10^{-3}	25	5×10^{-8}	25
Succinic	$C_4H_6O_4$	6.6×10^{-5}	25	2.8×10^{-6}	25
Sulfanilic	$C_6H_7O_3NS$	6.2×10^{-4}			
Sulfuric	H_2SO_4	....	..	2×10^{-2}	18
Sulfurous	H_2SO_3	1.7×10^{-2}	25	5×10^{-6}	25
Tartaric	$C_4H_6O_6$	1.1×10^{-3}	25	6.9×10^{-5}	25
Telluric	H_2TeO_4	6×10^{-7}	25	4×10^{-11}	25
Tellurous	H_2TeO_3	3×10^{-3}	25	2×10^{-8}	25
Trichloracetic	$C_2HO_2Cl_3$	2×10^{-1}	18		
Uric	$C_5H_4O_3N_4$	1.5×10^{-6}	25		
Valeric	$C_5H_{10}O_2$	1.6×10^{-5}	25		

From Hodgman and Lange, Handbook of Chemistry and Physics, 13th Edition, courtesy Chemical Rubber Publishing Co.

The Electro-chemical Series of Elements

In the table given below, the elements are electro-positive to the ones which follow them, and will displace them from solutions of their salts.

1. Caesium
2 Rubidium
3 Potassium
4 Sodium
5 Lithium
6 Barium
7 Strontium
8 Calcium
9 Magnesium
10 Beryllium
11 Ytterbium
12 Erbium
13 Scandium
14 Aluminum
15 Zirconium
16 Thorium
17 Cerium
18 Didymium
19 Lanthanum
20 Manganese
21 Zinc
22 Iron
23 Nickel
24 Cobalt
25 Thallium
26 Cadmium
27 Lead
28 Germanium
29 Indium
30 Gallium
31 Bismuth
32 Uranium
33 Copper
34 Silver
35 Mercury
36 Palladium
37 Ruthenium
38 Rhodium
39 Platinum
40 Iridium
41 Osmium
42 Gold
43 Hydrogen
44 Tin
45 Silicon
46 Titanium
47 Columbium
48 Tantalum
49 Tellurium
50 Antimony
51 Carbon
52 Boron
53 Tungsten
54 Molybdenum
55 Vanadium
56 Chromium
57 Arsenic
58 Phosphorus
59 Selenium
60 Iodine
61 Bromine
62 Chlorine
63 Fluorine
64 Nitrogen
65 Sulphur
66 Oxygen

From Brady, Materials Handbook, courtesy McGraw-Hill Book Co., Inc.

Resistivity of Electrolytes

(Kohlrausch and Holborn)

Grams substance in 100 g. of solution	Sp. gr.	Resistivity, ohms per cc.	Temperature coefficient for 1° C.	Gram equivalents per liter
		H_2SO_4 at 18° C.		
1.0	.....	21.93	0.00112	0.204
2.5	1.0161	9.24	0.00115	0.519
5.0	1.0331	4.82	0.00121	1.065
10.0	1.0673	2.57	0.00128	2.182
15.0	1.1036	1.85	0.00136	3.384
20.0	1.1414	1.54	0.00145	4.667
30.0	1.2207	1.36	0.00162	7.487
40.0	1.3056	1.48	0.00178	10.68
50.0	1.3984	1.86	0.00193	14.30
60.0	1.5019	2.70	0.00213	18.42
70.0	1.6146	4.67	0.00256	23.11
80.0	1.7320	9.13	0.00349	28.33
85.0	1.7827	10.30	0.00365	30.98
90.0	1.8167	9.38	0.00320	33.43
95.0	1.8368	9.84	0.00279	35.68
97.0	1.8390	12.50	0.00286	36.47
99.4	1.8354	118.00	0.00400	37.22
		HCl at 10° C.		
5.0	1.0242	2.55	0.00159	1.408
10.0	1.0490	1.59	0.00157	2.884
15.0	1.0744	1.35	0.00156	4.431
20.0	1.1001	1.32	0.00155	6.050
25.0	1.1262	1.39	0.00154	7.741
30.0	1.1524	1.52	0.00153	9.506
35.0	1.1775	1.70	0.00152	11.33
40.0	1.2007	1.95	.....	13.22
		KOH at 15° C.		
4.2	1.0382	6.85	0.00188	0.619
8.4	1.0777	3.69	0.00187	1.580
12.6	1.1177	2.67	0.00189	2.515
16.8	1.1588	2.20	0.00194	3.477
21.0	1.2088	1.97	0.00200	4.534
25.2	1.2439	1.86	0.00210	5.599
29.4	1.2908	1.85	0.00222	6.778
33.6	1.3332	1.92	0.00237	8.001
37.8	1.3803	2.10	0.00258	9.319
42.0	1.4298	2.39	0.00284	10.730

Grams substance in 100 g. of solution	Sp. gr.	Resistivity, ohms per cc.	Temperature coefficient for 1° C.	Gram equivalents per liter
	KCN at 15° C.			
3.25	1.0154	19.10	0.00208	0.508
6.5	1.0316	9.80	0.00194	1.031
	$AgNO_3$ at 18° C.			
5.0	1.0422	39.47	0.00219	0.307
10.0	1.0893	21.20	0.00218	0.642
15.0	1.1404	14.78	0.00216	1.009
20.0	1.1958	11.57	0.00213	1.410
25.0	1.2555	9.53	0.00211	1.851
30.0	1.3213	8.14	0.00210	2.338
35.0	1.3945	7.17	0.00208	2.879
40.0	1.4773	6.45	0.00206	3.485
45.0	1.5705	5.88	0.00205	4.168
50.0	1.6745	5.44	0.00206	4.940
55.0	1.7895	5.09	0.00207	5.800
60.0	1.9158	4.80	0.00210	6.780
	$CuSO_4$ at 18° C.			
2.5	1.0246	92.4	0.00214	0.322
5.0	1.0513	53.2	0.00217	0.661
10.0	1.1073	31.4	0.00219	1.393
15.0	1.1675	23.8	0.00232	2.202
17.5	1.2003	21.9	0.00237	2.642

Resistivity of Electrolytes.

Grams substance in 100 g. of solution	Potassium chloride resistivity, ohms per cc.	Sodium chloride resistivity, ohms per cc.	Calcium chloride resistivity, ohms per cc.
5	14.49	14.88	16.48
10	7.429	8.257	8.764
15	4.950	6.090	6.645
20	3.735	5.109	5.903
25	....	4.684	5.615

Resistivity of Electrolytes (*Continued*)

Grams substance in 100 g. of solution	Cadmium chloride resistivity, ohms per cc.	Ammon. sulphate resistivity, ohms per cc.	Cadmium sulphate resistivity, ohms per cc.
5	....	18.11	68.5
10	41.49	9.901	....
20	....	5.677	....
30	37.59	4.363	....

Nitric acid		Sodium hydrate	
Grams HNO_3 per 100 cc. solution	Resistivity, ohms per cc.	Grams NaOH per 100 cc. sol.	Resistivity, ohms per cc.
6.2	3.205	2.5	9.266
12.4	1.845	5.0	5.076
18.6	1.449	10.0	3.205
24.8	1.302	15.0	2.890
31.0	1.023	20.0	3.058
49.6	1.577	30.0	4.950
6.2	2.016	40.0	8.621

From Metallurgists and Chemists' Handbook, 2nd Edition, courtesy McGraw-Hill Book Co., Inc.

Electric Resistance of Some Metallic Oxides[1]

(Ohms per Cubic Centimeter)

Temperature deg. C.	Cr_2O_3	Fe_3O_4	SnO_2	NiO	CaO	Al_2O_3	SiO_2	MgO	ZrO
	All of these have a resistance of over 50,000 at room temperatures.								
400	6,000	11,750	900.0	3,000	....	....	....	....	....
450	2,450	4,300	400.0	1,115	....	....	....	....	....
500	1,250	2,450	235.0	490	....	....	....	....	....
550	1,000	1,450	125.0	400	....	....	....	....	....
600	850	1,200	68.0	330	....	....	....	....	....
650	1,175	845	56.0	240	....	....	....	....	....
700	1,010	710	47.0	195	....	....	....	....	....
750	950	510	42.0	121	....	....	....	....	....
800	690	357	37.0	220	....	....	....	....	....
850	668	290	32.0	280	....	....	....	....	....
900	520	210	28.0	190	....	....	....	....	....
950	395	162	25.5	81	....	....	....	....	....
1,000	345	127	24.0	115	....	....	....	....	....
1,050	335	117	23.0	93	....	....	....	....	....
1,100	330	105	22.25	45	....	....	....	....	....
Gas blow pipe......	....	....	....	....	550	190	590	600	580

It is safe to say that where the temperature exceeds 1500° C. it is impossible to obtain even approximately good electrical insulation by any means whatever. (NORTHRUP.)

All metallic oxides are solids and have a lower specific gravity than have the metals. They melt at higher temperatures than do the metals.

[1] *Zt. Electrochem.*, 1907, xiii, 589; as given in HOFMAN'S "General Metallurgy".

From Metallurgists and Chemists' Handbook, 2nd Edition, courtesy McGraw-Hill Book Co., Inc.

Thermal Resistivities[1]

APPROXIMATELY IN ORDER OF RESISTIVITY

(Temperature in Centigrade degrees)

	Thermal ohms[1]				Thermal ohms.[1]		
	Inch cube	Centimeter cube	Reference		Inch cube	Centimeter cube	Reference
Silver, 0°–100°	0.094	0.24	LB	Mercury, 0°–50°	5.5	14.1	LB
Copper (electrode mean), 100°–197°	0.090	0.23	H	Quartz, 0°	5.9	15.0	LB
Copper (electrode mean), 100°–837°	0.11	0.27	H	Graphite (probably plumbago) 7°	8.0	21.0	LB
Copper, 0°–100°, about	0.11	0.27	LB	Retort carbon, 0°	9.1	23.0	LB
Copper	0.13	0.32	LB	Magnesia brick, about 1000°	13.0	34.0	WQ
Copper, cast	0.12	0.29	CJ	Stone, calcareous, fine	16.0	42.0	P
Copper, rolled	0.11	0.28	CJ	Chromite brick, about 1000°	16.0	42.0	WQ
Copper, rolled	0.13	0.32	WF	Ice	16.0	42.0	LB
Aluminum, 0°–100°	0.27	0.69	LB	Marble, fine grained, gray	9.8	25.0	P
Graphite, Acheson (electrode mean), 100°–390°	0.28	0.71	H	Marble, coarse grained, white	12.0	31.0	P
Graphite, Acheson (electrode mean), 100°–914°	0.32	0.82	H	Marble, 30°	19.0	48.0	LB
Brass, 0°–100°	0.36	0.92	LB	Stone, calcareous, ordinary	20.0	51.0	P
Iron (electrode mean), 100°–398°	0.28	0.71	H	Firebrick, probably room temperature	21.0	53.0	D
Iron (electrode mean), 100°–398°	0.43	1.1	H	Firebrick, about 1000°	22.0	57.0	WQ
Iron, wrought	0.22	0.55	CJ	Firebrick, mean for 500°–1300°	23.0	57.0	Z
Iron, wrought, 0°	0.46	1.2	LB	Firebrick, mean for 0°–1300°	30.0	77.0	Z
Iron, wrought, 275°	0.76	1.9	LB	Firebrick, about 400°–800°	44.0	112.0	CE
Iron, wrought	0.79	2.0	WF	Firebrick, mean for 0°–500°	67.0	171.0	Z
Iron, cast	0.26	0.66	CJ	Checker brick, about 1000°	24.0	61.0	WQ
Iron, cast, 30°	0.63	1.6	LB	Gas retort brick, about 1000°	25.0	63.0	WQ
Steel	0.24	0.60	CJ	Slate, 94°	26.0	67.0	LB
Steel	0.81	2.1	WF	Building brick, about 1000°	29.0	72.0	WQ
Steel, various	0.81	2.1	LB	Glass pot, about 1000°	35.0	89.0	WQ
Steel, 10 per cent. manganese	3.0	7.7	LB	Porcelain, 95°	38.0	96.0	LB
Platinum	0.25	0.63	CJ	Terracotta, about 1000°	41.0	104.0	WQ
Platinum, 18°–100°	0.55	1.4	LB	Chalk, solid	43.0	109.0	LB
Platinum	1.1	2.9	WF	Cement, Portland, neat, 35°	44.0	110.0	N
Carbon (electrode mean) 100°–942°	0.72	1.9	H	Cement, Portland, 90°	132.0	336.0	LB
Carbon (electrode mean) 100°–360°	1.05	2.7	H	Lava	47.0	120.0	LB
Lead	0.33	0.83	CJ	Silica brick, about 1000°	47.0	120.0	WQ
Lead	1.10	2.8	WP	Kieselguhr brick, about 1000°	52.0	133.0	WQ
Lead, 0°–100°	1.2	3.0	LB	Red brick wall, average 8-in.–40-in. walls	62.0	160.0	W
Plumbago brick, about 1000°	3.8	9.6	WQ	Water, room temperature	72.0	180.0	LB
Carborundum brick, about 1000°	4.1	10.3	WQ	Glass, 28°	87.0	220.0	LB

Thermal Resistivities (*Continued*)

	Thermal ohms[1]				Thermal ohms[1]		
	Inch cube	Centimeter cube	Reference		Inch cube	Centimeter cube	Reference
Plumbago, 20°–155°, 26.1 per cent. solid matter	96.0	240.0	O	Charcoal, from leaves, 11.9 lb. per cu. ft., 100°	537.0	1370.0	W
Fine sand, 20°–155°, 51.4 per cent. solid matter	109.0	276.0	O	Charcoal, from leaves, 11.9 lb. per cu. ft., 50°	603.0	1530.0	N
Coarse sand, 20°–155°, 52.9 per cent. solid matter	110.0	280.0	O	Charcoal	723.0	1840.0	C
Cork, solid	131.0	333.0	LB	Feathers, 20°–155°, 2 per cent. solid matter	577.0	1470.0	O
Plaster of Paris, 0°	105.0	266.0	LB	Sawdust, 13.4 lb. per cu. ft., 50°	614.0	1560.0	N
Plaster of Paris, 20°–155°, 36.8 per cent. solid matter	221.0	562.0	O	Sawdust	620.0	1570.0	C
Slag concrete, 1 slag: 0.61 cement by weight, 50°	178.0	453.0	N	Sawdust, 13.4 lb. per cu. ft., 50°	765.0	1950.0	LB
Pumice stone, 18.2 lb. per cu. ft., 50°	169.0	430.0	N	Cork, granulated and compressed, 20°–188°	467.0	1190.0	S
Pumice stone	187.0	477.0	LB	Cork, ground, 10 lb. per cu. ft., 200°	614.0	1560.0	N
Brick dust, sifted	204.0	518.0	P	Cork, ground, 10 lb. per cu. ft., 50°	797.0	2030.0	N
Asbestos, 20°–155°, 34.2 per cent. solid matter	139.0	353.0	O	Air, 20°–155°	143.0	364.0	O
Asbestos, 36 lb. per cu. ft., 600°	166.0	422.0	N	Air, 0°	1700.0	4320.0	LB
Asbestos, 36 lb. per cu. ft., 50°	221.0	562.0	N	Cotton wool, 20°–155°, 1 per cent. solid matter	596.0	1520.0	O
Asbestos with air cells	416.0	1016.0	S	Cotton wool, 20°–155°, 2 per cent. solid matter	659.0	1570.0	O
Cardboard, below 0°	239.0	606.0	LB	Cotton wool, 5.05 lb. per cu. ft., 100°	572.0	1460.0	N
Ebonite, 48°	251.0	637.0	LB	Cotton wool, 5.05 lb. per cu. ft., 50°	627.0	1600.0	N
Petroleum, 13°	265.0	672.0	LB	Cotton wool	830.0	2110.0	C
Wood pine, parallel to fiber	313.0	796.0	LB	Cotton wool, loose	2170.0	5500.0	LB
Many liquids (hydrocarbons, etc.)	313.0	796.0	LB	Cotton wool, compressed	2810.0	7120.0	LB
Anthracite	317.0	803.0	LB	Hair felt, 20°–155°, 9.2 per cent. solid matter	633.0	1610.0	O
Chalk, 20°–155°, 25.3 per cent. solid matter	332.0	844.0	O	Hair felt, 21°–175°	790.0	2010.0	B
Very porous slag, 22.5 lb. per cu. ft., 50°	356.0	905.0	N	Hair felt	865.0	2200.0	C
Zinc white, 20°–155°, 8.8 per cent. solid matter	398.0	1010.0	O	Hair felt, below 0°	1080.0	2740.0	LB
Infusorial earth, 21°–175°	415.0	1050.0	B	Lampblack, 20°–155°, 5.6 per cent. solid matter	697.0	1770.0	O
Infusorial earth, 20°–155°, 11.2 per cent. solids	435.0	1110.0	O	Fine quartz sand	718.0	1820.0	LB
Infusorial earth, 20°–155°, 6 per cent. solid matter	472.0	1200.0	O	Silk, 6.3 lb. per cu. ft., 100°	662.0	1690.0	N
Infusorial earth, burned, 12.5 lb. per cu. ft., 450°	263.0	1675.0	N	Silk, 6.3 lb. per cu. ft., 50°	752.0	1920.0	N
Infusorial earth, burned, 12.5 lb. per cu. ft., 50°	477.0	1220.0	N	Wool, sheep's, 20°–155°, 2.1 per cent. solid matter	616.0	1570.0	O
Infusorial earth, loose, 21.8 lb. per cu. ft., 350°	427.0	1090.0	N	Wool, sheep's, 8.5 lb. per cu. ft., 50°	676.0	1720.0	N
Infusorial earth, loose, 21.8 lb. per cu. ft., 50°	562.0	1430.0	N	Wool, sheep's, 8.5 lb. per cu. ft., 100°	745.0	1890.0	C
Infusorial earth	745.0	1890.0	C	Wool, sheep's	803.0	2050.0	N
Magnesia carb., 85 per cent., 20°–188°	537.0	1370.0	S	Mineral wool, 21°–175°	737.0	1870.0	B
Magnesia, calcined, 20°–155°, 28.5 per cent. solids	160.0	470.0	O	Mineral wool, 0°–18°	1010.0	2570.0	C
Magnesia, calcined, 20°–155°, 4.9 per cent. solids	544.0	1380.0	O	Hard rubber	1060.0	2680.0	LB
Magnesia calcined, 20°–155°, 2.3 per cent. solids	554.0	1410.0	O	Wood, pine, radially	1070.0	2720.0	LB
Magnesia, calcined, 21°–175°	572.0	1450.0	B	Loose fibrous materials, 9°	1540.0	3920.0	LB
Charcoal, pine, 20°–155°, 11.9 per cent. solid matter	494.0	1260.0	O	Flannel	2650.0	6720.0	LB

[1] Hering uses an expression, the thermal ohm, which is the resistance through which 1 watt of heat flow will pass when the temperature drop is 1° C. Hence, if R is the thermal resistance in thermal ohms, W the flow of heat in watts and T the temperature in Centigrade degrees:

$$W = \frac{T}{R}$$

Or if r is the specific thermal resistance in thermal ohms per centimeter cube then

$$R = \frac{rL}{S}$$

where L is length and S is cross section.

To reduce a thermal conductivity in gram calories per second to resistivity in thermal ohms, multiply the reciprocal of the conductivity by 0.2388, when both are for 1 cm.^{3} To reduce gram calories to watts, multiply by 4.186. In order to compare thermal resistivities Mr. Hering called that of silver the unit, and reduced all values to this base.

To use the data of the table for all purposes it may be remembered that

watts × 0.00134111 = horse power
watts × 0.0568776 = B.t.u. per minute.

B — George M. Brill. *Trans.*, Am. Soc. Mech. Eng., XVI, p. 827. Coverings on 8-in. steam pipes.

C — J. J. Coleman. *Engineering*, Sept. 5, 1884, p. 237. Ice melted in cube surrounded with the materials. Temperatures 0–18° and 0–38° C. The values were given relatively to each other; to reduce them to absolute measure it is here assumed that the value for sawdust is 620, thermal ohm, inch cube units.

CE — Clement and Egy.

CJ — Calvert and Johnson. Relative values based on silver. Reduced here on the basis that the conductivity of silver is 1.0 in gram calories per second, centigrade, centimeter cube units.

D — Depretz, Hood. "Warming and Ventilating Buildings," p. 249. Given relatively to marble, here assumed to be 10 thermal ohms, inch cube units.

H — Carl Hering. "The Proportions of Electrodes for Furnaces." (Table.) Paper read before the Am. Inst. Elec. Eng., March 31, 1910. Mean values when materials are used as furnace electrodes.

LB — Landolt and Boernstein tables. The values here chosen are mostly approximate means of the generally numerous and sometimes greatly differing values given by different observers. For the individual values and for the authorities see those tables. They also include values for very many other materials.

N — Wilhelm Nussel. *Zeit. Ver. Deut. Eng.*, June, 1908, p. 906, table, p. 1006. Materials were placed between two concentric metallic spheres or cubes. Heat generated electrically in interior. Temperature measured with thermocouples at numerous depths in the material after several days' heating. As here given they represent the resistivities at the temperatures stated, not the means over a range. Probably the best and most reliable determinations published. His conductivities are here assumed to be in terms of kilogram calories per hour, centigrade, meter cube, units; although not so stated directly in the original, it is undoubtedly what is meant. An abstract appeared in the *Eng. Digest*, August, 1908, p. 168, in which the units are reduced to thermal units, feet, inches and Fahrenheit degrees; the formula there given omits to say that it is necessary to multiply by the temperature also.

O — Prof. Ordway. *Trans.*, Am. Soc. Mech. Eng., Vol. VI, 1884–5, p. 168. Tested in plates 1 in. thick between two flat iron surfaces, one of them heated by steam, the heat emitted by the other being measured calorimetrically. Extended, carefully made researches; presumably very good values. There is an error in the heading in Table VII; square inch should read square meter, as in the others.

P — Peclet, Box. "Practical Treatise on Heat." Presumably ordinary weather temperatures.

S — H. G. Stott. *Power*, 1902. Pipe coverings. 200 ft. of 2-in. pipe heated electrically to constant temperature. Coverings were somewhat over 1 in. thick; they are here reduced to 1 in. Heat transmitted to air, hence these resistances include that at the surface.

W — Wolff. *Jour. Frank. Inst.*, 1893. The transmission of heat from the interior to the exterior of buildings through the walls; hence ordinary weather temperatures. Prescribed by law by German Government for heating plants. Said to agree well with good American practice. The value here given is an average of all the individual ones, omitting the first one, which differed greatly from all the others.

WF — Wiedemann and Franz; relative values based on silver. Reduced here on the basis that the conductivity of silver is 1.0 in gram calories per second, centigrade, centimeter cube, units.

WQ — Wologdine, Queneau. The temperatures were about 1000° C.; the materials were those of commerce and do not refer to extra pure or to inferior grades. The present writer is of the opinion, based on the method used in the tests, that these values are probably too low.

Z — Source lost, but probably fairly good values.

For further information the reader is referred to *Metallurgical and Chemical Engineering*, September, 1909, p. 383; February, 1909, p. 72; December, 1911, p. 652.

According to William Nussel, thermal conductivity increases by 1/27.3 for each degree Centigrade rise in temperature.

From Liddell, Metallurgists and Chemists' Handbook, 2nd Edition, courtesy McGraw-Hill Book Co., Inc.

Hardness Numbers

The Brinell method of determining hardness is by the indentation effect of a hard ball pressed into the surface of the metal to be tested. Tables of hardness numbers corresponding to the various indentation measurements are furnished by the makers of the machines.

The Scleroscope, or "Shore", method measures hardness by a comparison of the effect of the drop and rebound of a diamond-tipped hammer dropping by gravity from a fixed height. The resulting rebound is then read on a graduated scale.

The Rockwell hardness tester measures hardness by determining the depth of penetration under load of a steel ball or diamond cone in the material being tested. Rockwell hardness is expressed as a number, which is read on a graduated gage.

The Moh hardness scale for abrasives and minerals is measured by scratch comparison, the mineral talc being taken as 1, and the diamond as 10 on the scale.

Scale of Hardness for Minerals — Moh Scale

	Hardness Number		Hardness Number
Talc	1	Orthoclase	6
Gypsum	2	Quartz	7
Calcite	3	Topaz	8
Fluorite	4	Corundum	9
Apatite	5	Diamond	10

HARDNESS GRADES IN WOODS

1. Excessively hard	Lignum-vitae, Ebony
2. Extremely hard	Boxwood, Lilac, Jarrah, Karri, Bluegum
3. Very hard	Whitehorn, Blackthorn, Persimmon
4. Hard	Hornbeam, Elder, Yew, Laburnum
5. Rather hard	Ash, Holly, Plum, Elm
6. Firm	Teak, Chestnut, Beech, Walnut, Apple, Oak
7. Soft	Willow, Deal, Alder, Australian red cedar, Birch, Hazel
8. Very soft	White pine, Poplar, Redwood.

From Brady, Materials Handbook, courtesy McGraw-Hill Book Co., Inc.

Metal Gages in Common Use

Gage No.	B. & S.	B.W.G.	B. I. G.	W. & M.	Music wire	U. S. G.	Twist drill	Stubs steel wire	Amer. screw	Zinc
7-0	....	...	.500	.4900	....	.5000	....	...	....	....
6-0	....	...	.464	.4600	....	.4690	....	...	....	....
5-0	....	...	.432	.4300	....	.4380	....	...	....	....
4-0	.4600	.454	.400	.3940	....	.4060	....	...	....	....
3-0	.4100	.425	.372	.3630	....	.3750	....	...	.0315	....
2-0	.3650	.380	.348	.3310	.0085	.3440	....	...	.0447	....
0	.3250	.340	.324	.3070	.0090	.3130	....	...	.0578	....
1	.2890	.300	.300	.2830	.0100	.2810	.2280	.227	.0710	.002
2	.2580	.284	.276	.2630	.0110	.2660	.2210	.219	.0842	.004
3	.2290	.259	.252	.2440	.0120	.2500	.2130	.212	.0973	.006
4	.2040	.238	.232	.2250	.0130	.2340	.2090	.207	.1100	.008
5	.1820	.220	.212	.2070	.0140	.2190	.2055	.204	.1240	.010
6	.1620	.203	.192	.1920	.0160	.2030	.2040	.201	.1370	.012
7	.1440	.180	.176	.1770	.0180	.1880	.2010	.199	.1500	.014
8	.1290	.165	.160	.1620	.0200	.1720	.1990	.197	.1630	.016
9	.1140	.148	.144	.1480	.0220	.1560	.1960	.194	.1760	.018
10	.1020	.134	.128	.1350	.0240	.1410	.1940	.191	.1890	.020
11	.0907	.120	.116	.1210	.0260	.1250	.1910	.188	.2030	.024
12	.0808	.109	.104	.1060	.0280	.1090	.1890	.185	.2160	.028
13	.0720	.095	.092	.0915	.0300	.0938	.1850	.182	.2290	.032
14	.0641	.083	.080	.0800	.0320	.0781	.1820	.180	.2420	.036
15	.0571	.072	.072	.0720	.0340	.0703	.1800	.178	.2550	.040
16	.0508	.065	.064	.0625	.0360	.0625	.1770	.175	.2680	.045
17	.0453	.058	.056	.0540	.0380	.0563	.1730	.172	.2820	.050
18	.0403	.049	.048	.0475	.0400	.0500	.1695	.168	.2950	.055
19	.0359	.042	.040	.0410	.0420	.0438	.1660	.164	.3080	.060
20	.0320	.035	.036	.0348	.0440	.0375	.1610	.161	.3210	.070
21	.0285	.032	.032	.0318	.0460	.0344	.1590	.157	.3340	.080
22	.0254	.028	.028	.0286	.0480	.0313	.1570	.155	.3470	.090
23	.0226	.025	.024	.0258	.0510	.0281	.1540	.153	.3610	.100
24	.0201	.022	.022	.0230	.0550	.0250	.1520	.151	.3740	.125
25	.0179	.020	.020	.0204	.0590	.0219	.1500	.148	.3870	.250
26	.0159	.018	.018	.0181	.0630	.0188	.1470	.146	.4000	.375
27	.0142	.016	.0164	.0173	.0670	.0172	.1440	.143	.4130	.500
28	.0126	.014	.0148	.0162	.0710	.0156	.1410	.139	.4260	1.000
29	.0113	.013	.0136	.0150	.0740	.0141	.1360	.134	.4390	....
30	.0100	.012	.0124	.0140	.0780	.0125	.1285	.127	.4530	....
31	.0089	.010	.0116	.0132	.0820	.0109	.1200	.120	.4660	....
32	.0079	.009	.0108	.0128	.0860	.0101	.1150	.115	.4790	....

Metal Gages in Common Use (Continued)

Gage No.	B. & S.	B.W.G.	B. I. G.	W. & M.	Music wire	U. S. G.	Twist drill	Stubs steel wire	Amer. screw	Zinc
33	.0071	.008	.0100	.0118	.0900	.0094	.1130	.112	.4920	....
34	.0063	.007	.0092	.0104	.0940	.0086	.1110	.110	.5050	....
35	.0056	.005	.0084	.0095	.0980	.0078	.1100	.108	.5180	....
36	.0050	.004	.0076	.0090	.1020	.0070	.1065	.106	.5320	....
37	.0044	...	.0068	.0085	.1060	.0066	.1040	.103	.5450	....
38	.0040	...	.0060	.0080	.1120	.0063	.1015	.101	.5580	....
39	.0035	...	.0052	.0075	.1180	....	.0995	.099	.5710	....
40	.0031	...	.0048	.0070	.1250	....	.0980	.097	.5840	....
41	....	...	.0044	.0066	....	....	.0960	.095	.597	....
42	....	...	.0040	.0062	....	....	.0935	.092	.611	....
43	....	...	.0036	.0060	....	....	.0890	.088	.624	....
44	....	...	.0032	.0058	....	....	.0860	.085	.637	....
45	....	...	.0028	.0055	....	....	.0820	.081	.650	....
46	....	...	.0024	.0052	....	....	.0810	.079	.663	....
47	....	...	.0020	.0050	....	....	.0785	.077	.676	....
48	....	...	.0016	.0048	....	....	.0760	.075	.690	....
49	....	...	.0012	.0046	....	....	.0730	.072	.703	....
50	....	...	.0010	.0044	....	....	.0700	.069	.716	....
51	....	...	....	....	....	....	.0670	...	....	....
52	....	...	....	....	....	....	.0635	...	....	....
53	....	...	....	....	....	....	.0595	...	....	....
54	....	...	....	....	....	....	.0550	...	....	....
55	....	...	....	....	....	....	.0520	...	....	....
56	....	...	....	....	....	....	.0465	...	....	....
57	....	...	....	....	....	....	.0430	...	....	....
58	....	...	....	....	....	....	.0420	...	....	....
59	....	...	....	....	....	....	.0410	...	....	....
60	....	...	....	....	....	....	.0400	...	....	....

The Brown & Sharpe, or American standard, wire gage is used for aluminum, brass, bronze, and German silver sheet, also for non-ferrous wires and rod.

The Birmingham wire gage (B. W. G.), also known as the Stubs' iron wire gage, applies to seamless tubing and to sheet spring steel.

The British imperial gage (B. I. G.), also known as the legal standard gage (L. S. G.), is used in Great Britain, and sometimes in the United States for copper wire.

The Washburn & Moen gage, also known as the Roebling gage, or the national wire gage, applies to all bare, galvanized, and annealed steel and iron wire, and to tinned steel wire, and spring steel wire.

The music wire gage is used for "music" wire.

The United States standard gage is used for steel and iron plate, galvanized, tinned, or terne.

The twist drill gage, also known as the Morse gage, is used for drill steel rod.

Stubs' steel wire gage is used for steel drill rod.

The American screw gage is applied to machine screws.

The zinc gage is used for sheet zinc.

From Brady, Materials Handbook, courtesy McGraw-Hill Book Co., Inc.

DEFINITIONS OF UNITS

Activity. Power or rate of doing work; unit: the watt.

Ampere. Unit of electrical current. The international ampere, "which is one-tenth of the unit of current of the C.G.S. system of electro-magnetic units, and which is represented sufficiently well for practical use by the unvarying current which, when passed through a solution of nitrate of silver in water, and in accordance with accompanying specifications, deposits silver at the rate of 0.001118 of a gram per second."

The ampere = 1 coulomb per second = 1 volt through 1 ohm = 10^1 E.M.U. = 3×10^9 E. S. U. (E. M. U. = C. G. S. electromagnetic units. E. S. U. = C. G. S electrostatic units.)

Amperes = volts/ohms = watts/volts = $(\text{watts/ohms})^{1/2}$.

Amperes x volts = amperes^2 x ohms = watts.

Angstrom. Unit of wave-length = 10^{-10} meter.

Atmosphere. Unit of pressure.

English normal = 14.7 pounds per sq. in. = 29.929 in. = 760.18 mm. Hg. 32° F.

French normal = 14.70 pounds per sq. in. = 29.922 in. = 760 mm. of Hg. 0° C.

Bougie Decimale. Photometric standard.

British Thermal Unit. Heat required to raise one pound of water at its temperature of maximum density 1° F. = 252 gram-calories.

Calory. Small calory = gram-calory = therm = quantity of heat required to raise one gram of water at its maximum density, one degree Centigrade.

Large calory = kilogram-calory = 1000 small calories = one kilogram of water raised one degree Centigrade at the temperature of maximum density.

Candle. Photometric standard.

Carat. The diamond carat standard in U. S. = 200 milligrams. Old standard = 205.3 milligrams = 3.168 grains.

The gold carat: pure gold is 24 carats; a carat is 1/24 part.

Carcel. Photometric standard.

Circular Area. The square of the diameter = 1.2733 x true area.

True area = 0.785398 x circular area.

Coulomb. Unit of quantity. The international coulomb is the quantity of electricity transferred by a current of one international ampere in one second = 10^{-1} E.M.U. = 3×10^9 E.S.U.

Coulombs = (volts-seconds) /ohms = amperes x seconds.

Cubit = 18 inches.

Day. Mean solar day = 1440 minutes = 86400 seconds = 1.0027379 sidereal days.

Sidereal day = 86164.10 mean solar seconds.

Digit. 3/4 inch; 1/12 the apparent diameter of the sun or moon.

Diopter. Unit of "power" of a lens. The number of diopters = the reciprocal of the focal length in meters.

Dyne. C. G. S. unit of force = that force which acting for one second on one gram produces a velocity of one centimeter per second = weight in grams divided by the acceleration of gravity in centimeters per second.

Electrochemical Equivalent is the ratio of the mass in grams deposited in an electrolytic cell by an electrical current to the quantity of electricity.

Energy. *See* Erg.

Erg. C. G. S. unit of work and energy = one dyne acting through one centimeter.

Farad. Unit of electrical capacity. The international farad is the capacity of a condenser charged to a potential of one international volt by one international coulomb of electricity = 10^{-9} E. M. U. = 9 x 10^{11} E. S. U.

The one-millionth part of a farad (microfarad) is more commonly used.

Farads = coulombs/volts.

Foot-pound. The work which will raise one pound one foot high.

Foot-poundals. The English unit of work = foot-pounds/g.

g. = the acceleration produced by gravity.

Gauss. A unit of intensity of magnetic field = 1 E. M. U. = 1/3 x 10^{-10} E. S. U.

Gram-centimeter. The gravitation unit of work = g. ergs.

Gram-molecule = x grams where x = molecular weight of substance.

Gravitation Constant = G in formula G $\frac{mm^2}{r^2}$ 666.07 x 10^{-10} cm.^{3}/gr. sec.^{2}

Heat of the Electric Current generated in a metallic circuit without self-induction is proportional to the quantity of electricity which has passed in coulombs multiplied by the fall of potential in volts, or is equal to (coulombs x volts) /4.181 in small calories.

The heat in small or gram-calories per second = (amperes^2 x ohms)/ 4.181 = volts^2/ (ohms x 4.181) = (volts x amperes) /4.181 = watts/4.181.

Heat. Absolute zero of heat = −273.13° Centigrade, −459.6° Fahrenheit, 218.5° Reaumur.

Hefner Unit. Photometric standard.

Henry. Unit of induction. It is "the induction in a circuit when the electromotive force induced in this circuit is one international volt, while the inducing current varies at the rate of one ampere per second" = 10^9 E. M. U. = 1/9 x 10^{-11} E. S. U.

Horse-power. The practical unit of power = 33,000 pounds raised one foot per minute = 550 foot pounds per second = 0.746 kilowatt = 746 watts.

Joule. Unit of work = 10^7 ergs.

Joules = (volts^2 x seconds) /ohms = watts x seconds = amperes^2 x ohms x seconds

Joule's Equivalent. The mechanical equivalent of heat = 4.185 x 10^7 ergs.

Kilodyne. 1000 dynes. About 1 gram.

Lumen. Unit of flux of light-candles divided by solid angles.

Megabar. Unit of pressure = 0.987 atmospheres.

Megadyne. One million dynes. About one kilogram.

Meter Candle. The intensity lumination due to standard candle distant one meter.

Mho. The unit of electrical conductivity. It is the reciprocal of the ohm.

Micro. A prefix indicating the millionth part.

Microfarad. One millionth of a farad, the ordinary measure of electrostatic capacity.

Micron. (μ) = one millionth of a meter.

Mil. One thousandth of an inch.

Milli-. A prefix denoting the thousandth part.

Month. The anomalistic month = time of revolution of the moon from one perigee to another = 27.55460 days.

The nodical month = draconitic month = time of revolution from a node to the same node again = 27.21222 days.

The sidereal month = the time of revolution referred to the stars = 27.32166 days (mean value), but varies by about three hours on account of the eccentricity of the orbit and "perturbations."

The synodic month = the revolution from one new moon to another = 29.5306 days (mean value) = the ordinary month. It varies by about 13 hours.

Ohm. Unit of electrical resistance. The international ohm is based upon the ohm equal to 10^9 units of resistance of the C. G. S. system of electromagnetic units, and "is represented by the resistance offered to an unvarying electric current by a column of mercury, at the temperature of melting ice, 14.4521 grams in mass, of a constant cross section and of the length of 106.3 centimeters" = 10^9 E. M. U. = $1/9 \times 10^{-11}$ E. S. U.

International ohm = 1.01367 B. A. ohms = 1.06292 Siemens' ohms.

B. A. ohm = 0.98651 international ohms.

Siemens' ohm = 0.94080 international ohms.

Pentane Candle. Photometric standard.

Pi = π = ratio of the circumference of a circle to the diameter = 3.14159265359.

Poundal. The British unit of force. The force which will in one second impart a velocity of one foot per second to a mass of one pound.

Radian = $180°/\pi = 57.29578° = 57° 17' 45'' = 206625''$.

Secohm. A unit of self-induction = 1 second x 1 ohm.

Therm = small calory = quantity of heat required to warm one gram of water at its temperature of maximum density one degree Centigrade.

Thermal Unit, British = the quantity of heat required to warm one pound of water at its temperature of maximum density one degree Fahrenheit = 252 gram-calories.

Volt. The unit of electromotive force (E. M. F.). The international volt is "the electromotive force that, steadily applied to a conductor whose resistance is one international ohm, will produce a current of one international ampere, and which is represented sufficiently well for practical use by 1000/1434 of the electromotive force between the poles or electrodes of the voltaic cell known as Clark's cell, at a temperature of 15° C. and prepared in the manner described in the accompanying specification" = 10^8 E. M. U. = 1/300 E. S. U.

Volt-ampere. Equivalent to watt/power factor.

Watt. The unit of electrical power = 10^7 units of power in the C. G. S. system. It is represented sufficiently well for practical use by the work done at the rate of one Joule per second.

Watts = volts x amperes = amperes^2 x ohms = volts^2/ohms (direct current or alternating current with no phase difference).

Watts x seconds = Joules.

Weber. A name formerly given to the coulomb.

Year.

Anomalistic year = 365 days, 6 hours, 13 minutes, 48 seconds.
Sidereal year = 365 days, 6 hours, 9 minutes, 9.314 seconds.
Ordinary year = 365 days, 5 hours, 48 minutes, 46 + seconds.
Tropical year same as the ordinary year.

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